

COAL AGE

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Energy or Atrophy?

THREE years of peace in the bituminous-coal industry! Shall they be years of construction or deterioration? Shall the companies energize or atrophy? In these years of peace is a chance for notable constructive work. In fact it may be said that only those companies which confront the situation boldly now and bring their mines up to the best practice devised or projected will be able to sail through the three years of peace, weak market and competition. Only those who modernize their mines—who in 1924 do all they can to cheapen their ways of operation—will see 1927. If nothing is done, if their owners “wait and see,” the mines may endure but the properties will change hands.

Some will hope to win by heartening their sales force by cutting salaries and by discharging a man here and there at the office and the mine, but only by radical improvements at the mines can the true solution be found. Cheaper coal, obtained by better machinery and by a cutting down of risks, will alone work the reformation. What improvement is made must needs be fundamental. No half measures will serve. The result will be obtained not so much by removing needed officials, repair and maintenance men but by the broader policy of providing mechanical appliances that will actually make men superfluous.

It will be necessary to remember that the mine is the fighting front. The comforts of the rearguard must be renounced and the fight must be pressed where the victory alone can be won—at the face—not forgetting of course the necessity of providing the necessary finances for the needed mine equipment.

Hoodlumism

ONE day a cloud of dust swept aggressively up the road into a troublesome Colorado coal camp. A lean-jawed ranger on a motorcycle burst out of it and halted in front of a crowd of scowlers. “I hear somebody in this town said he was gonna get the first ranger that come in. Where’s that man?” he demanded. The scowlers swallowed and blinked. Some appeared to shrink back. “I don’t think nobody said that,” finally offered somebody. “All right then,” replied the ranger. The cycle roared, the dust cloud rose, and he was gone but not forgotten. That town remembered such occurrences.

What if the Kluxers and the Knights of the Flaming Circle and the rest of them down in Herrin, Ill., had some such remembrance? Would there be so many hot guns and so many fresh graves and such hell on earth for the decent citizens of Williamson County? But they have no state rangers in Illinois. One of the reasons why they haven’t is that organized labor killed the constabulary bill in the last session of the State Legislature.

Violence has come to be a habit in the solidly unionized coal field of “Bloody Williamson.” The spirit of

disregard for law has grown up there among a large number of men who have let powerful unionism go to their heads. There are good, sound, sane citizens among the union miners of that territory, just as there are in every other union field, but the isolation of the region from every interest but the unionized production of coal has given too many of those men the idea that the law of the union, which has made them dominant in their neighborhood, is the only law worth obeying. Some of them are getting wobbly about obeying even that.

Union propaganda blamed bolshevism for the 1922 outbreak of these men—the infamous Herrin massacre. Bolshevism can hardly be blamed for the moonshine war of this year. It is due to just plain lawlessness of mind—the same inflamed mental attitude which led to the butchery of twenty-two non-union men in Herrin two years ago. Only one thing will help to check it—outside control. Sending in troops periodically is clumsy. The only form of outside control worth a whoop is offered in the form of a state constabulary. Such a force is needed so badly that even the mine workers’ union could benefit by its suasion. Rangers, by inspiring more respect for statute law in the minds of Williamson County miners, might evoke more respect for union law. There were indications at the Indianapolis union convention and elsewhere that union law is suffering from lack of respect in Illinois. Hoodlumism is bad for any union. Mr. Lewis and Mr. Farrington might bear this in mind when the next constabulary bill comes up in Illinois.

The Union Will Learn

“WE ARE weak; we can’t fight now,” was the doctrine preached to the United Mine Worker delegates at the Indianapolis convention. So they sent their men to Jacksonville pacifically minded. The delegation was pacific enough in its attitude there. Unionism did not need to wave a bludgeon. Nobody stoutly demanded that miners take a cut in wages. Nearly everybody but the operators from Illinois were reasonably willing to give the miners what they asked—a four-year continuance of the present scale. And the trimming of that program to three years was made principally because Illinois gagged at the dose, feeling that the program is nearly suicidal. But is it?

Of course, many a coal company will have to retire from the field. But with them must go an army of union miners. This means further weakness of the union. The first thing to expect of those discolated miners is that they travel over into non-union fields and try to remain in the kind of labor they know and like.

They may be good union men but they must live and they will go where they can work even if it be into non-union territory, just as hundreds of them did during the 1922 strike. This gives the non-union operator a higher hand. Likewise, it gives the union operator more opportunity to select the men he wants to keep,

which means an increasing opportunity to run his own property instead of letting unionism run it as is generally the case in many union fields.

What does all this mean? Doesn't it mean that an already weakened union is going to be compelled to recognize the fact that union-field wages must be adjusted downward if union coal is to keep any of its markets and continue in production? That is exactly what it means. President Lewis could not propose it to his men now. The rank and file would strike. A strike would be ruinous to all unionism and all union fields. Therefore the rank and file must learn of its necessity through bitter experience.

The bitter experience is now starting. Every mine shutdown makes the bitterness more poignant. The natural result of it all is an appeal by the union for a change in the wage agreement. Some day such an appeal will be made by the union by the exercise of nothing but plain common sense—unless government intervention or some other extraneous influence can be dragged in by Mr. Lewis.

Much at Little Cost

SUCH a small concession to public need and private virtue is federal inspection! One is almost ashamed to suggest so little to those who have done so much. If we had argued that the anthracite region spend \$5,000 or \$6,000 per day for inspection of its own and had urged that coal that did not meet the needs of that inspection should go back to the breaker and be treated again till it met with specifications, that would have been asking a sacrifice indeed. We are sure that the anthracite region would have demurred. "Two millions a year! Preposterous!" would have been the cry.

If we had argued that the railroad coal companies should sell their coal under the market price, taking no advantage of the fact that other companies were selling for much more, we should have been regarded as hopeless idealists.

But these things have been done, are being done. The second is so unusual, so self-denying, that the public persistently doubts that it is being done and tries to suggest it is a trick of which some secret, subtle advantage is being taken.

Yet when we argue that the federal government should inspect cars here and there at its own expense and see if those that have no inspection and those that have are alike producing coal of the specification now demanded we are told by some that it is too much. This little dip into Jordan, this ceremonial washing is too great a concession, we are told, to be taken by men who made such magnanimous provisions as those for an elaborate self-inspection of every car and a regulation of prices on all the domestic sizes sold.

No one can explain the difference except that the distinction is a "Little thing but mine own." The anthracite companies made their own big concessions, but this one is suggested to them without ostentation by a federal bureau, and consequently they demur about it. We cannot see why.

But is this concession little—if concession it may be termed? Surely it gives the public such assurance of right dealing, such an advertisement of rectitude of purpose that though it cost nothing it will do more to establish the anthracite industry in the good will of the public than either or both the concessions already

made. It will earn the public good will; it will promote the public confidence. At a time when oil is getting into public reprobation, and for good reason, coal will come back as have the railroad and central-station industries. Why not make the venture, if venture it be?

All Soft-Coal Mines Are Powder Magazines

RECENTLY a soft-coal mine superintendent in asking a question said incidentally that his mine was a safe one. We have forgotten where the mine was. It was not, however, in the anthracite region, so we were confident that it was a powder magazine and liable, if he did not take precautions—unusual precautions—to explode. He has a dangerous mine and we did not fail to tell him so. If the public fools itself that any of the bituminous mines are safe from explosion it is deceived, unless indeed the mine has been made safe by diligent stone dusting.

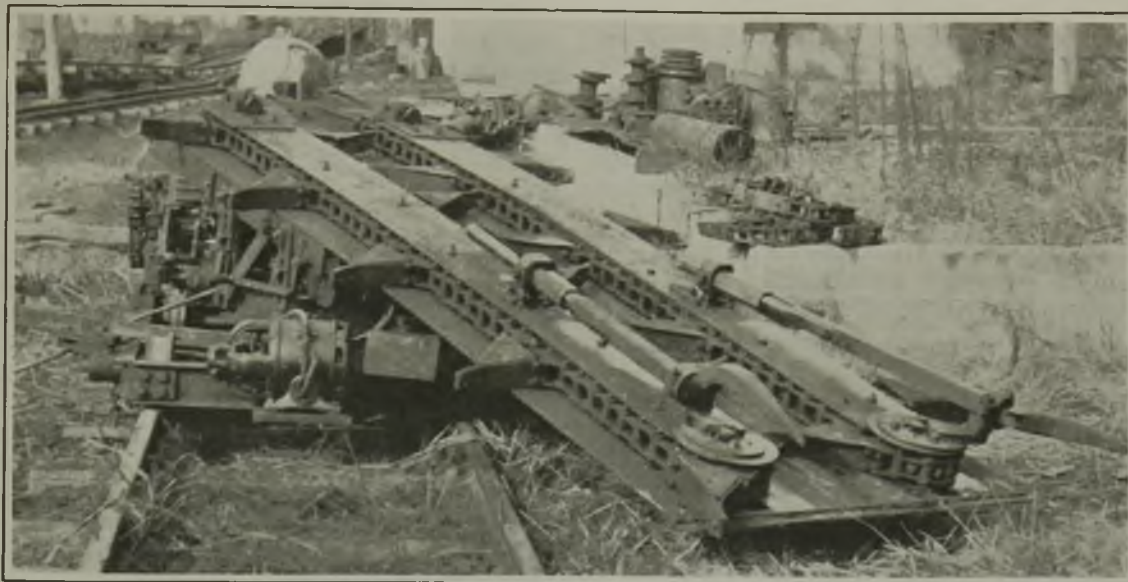
In the Ruhr the operators at last are beginning to see that humidification is at best only a palliative. It has done much to make the mines safer, but rock dusting is a greater security, and at that it must be thorough. Great Britain with its 50-per cent admixture of stone dust has altogether too many explosions; the Belgian and French rule of requiring 70 per cent of inert material seems preferable.

Unfortunately, in the United States the cars are built up with lumps, and the coal in consequence rolls off the cars whenever brakes are applied to either the locomotives or the cars. In this way the roads are strewn with material which soon is ground to an explosive dust. So long as the practice continues a road treated with rock dust inevitably will soon be rendered dangerous. Loading machines with or without conveyors will largely correct that condition because the best that can be done economically with a loading machine is to load the coal "baldy," or with only a rounded top. When the brakes are applied on such a car it will merely shake down, leaving the coal still in the bed. Furthermore, by concentrating operation proper treatment of the few roadways involved will be a job well within economical possibility.

At the mines of the Phelps Dodge Corporation in New Mexico all the cars are lightly loaded. In consequence the coal-dust evil is reduced to a minimum. This company also is going heavily into the practice of rock dusting. Shelves 2,000 ft. in length have been introduced to carry rock dust or adobe and the same material is being spread by the cement gun and other methods. The Old Ben Corporation also is using rock dust generously to protect its mines.

The movement is spreading. No one wants to have a mine bespread with a material that is and has been frequently used as constituent for the manufacture of a low-grade but extremely effective explosive, unless indeed that constituent is guarded by some inert material.

THERE IS CO-OPERATION IN COAL NOW, if there never was before. Those numerous bituminous-coal operators who have contended that the industry needed only a long period of low market to eliminate the unfit and thereby correct many coal evils have long had the co-operation of heavy storers, of smooth-running railroads, of plenitude of labor and even of the Great Operator himself, who has modified the winter thus far to a degree seldom exceeded.



One More Mechanical Loader Comes to Light

Wilson Chainloader for Low Coal Weighs 4,600 Lb.
and Has Maximum Height of 32 In.—It Has Loaded
69 Tons of Coal a Day and 120 Tons of Loose Gob

AROUND the corner of almost every gob pile in the American coal fields somebody is quietly developing an underground coal loader. It is no surprise, then, to learn that F. N. Wilson, of St. Louis, Mo., working under the paternal interest of the Southern Coal, Coke & Mining Co., of that city, now has what he calls the Wilson Chainloader fairly well developed after nearly two years of experimentation and back-breaking work. This machine, the appearance of which is suggestive of the Joy loader but which differs from it in many respects, is now working in one of the Bell Coal & Navigation Co.'s mines near Sturgis, Ky., under the inventor's eye and hand.

W. F. Davis, general superintendent for the Southern Coal, Coke & Mining Co., said early in January that the machine "is handling a clod and bastard lime, heavily shot, of course, to make it as small as possible, at the rate of 15 tons an hour." The machine has been loading coal also. On 12-ft. entry work, where, of course, it was handicapped by narrowness just as any loader would have been, it has loaded about 30 tons a day, but in 25-ft. rooms its best day was Aug. 29, 1923, when it loaded out 69 tons. This work was in coal not exceeding 40 in. in thickness.

The machine in its present form is designed especially for use in thin coal. It stands 32 in. high from the rail to the highest point on the machine—a sprocket on

the top of the upper end of a sloping conveyor. It is possible that this height can be further reduced to 28 in. The machine today therefore can load under a roof approximately 36 in. above the rail. It weighs about 4,600 lb.

The Chainloader is made up of two conveyors and the mechanism that drives them, all mounted on a four-wheel self-propelled truck, the wheelbase of which is 48 in. long. The main conveyor is 12 ft. long and slopes at an angle of about 18 deg. when the front end is lowered to the floor in operating position. It pivots at the back and can be swung through an arc with a front-end cord of 16 ft. Coal is gathered onto this swinging conveyor and delivered at the top of the machine to a non-adjustable conveyor which extends horizontally backward over the car to be loaded. The machine is driven by three motors—one of 7½ hp. actuating the gathering arms and main conveyor, one of 2 hp. affording traction and the third, of 2 hp., operating the rear conveyor.

The digging and gathering of the coal to the main conveyor is done by two kinds of arms—two heavy digger bars and a series of conveyor arms. The digger bars remind one of the flails which operate on the Joy machine, although there are important differences. Thus they are neither jointed nor flexible. One of these digger bars is mounted at each side of the front end of the conveyor pan or tread plate. It is about 6 ft. long and made from tool steel 2 in. square. The front end is curved in sickle shape and is pointed. Just back of this curve the bar is attached to a crank disk by

The headpiece shows the Wilson Chainloader, which is designed for thin coal. This machine has been working in a 40-in. seam and, without reducing its present maximum height of 32 in., could load coal in a 36-in. deposit. This picture gives some idea of the conveyor arms.

a substantial tool-steel pin. The crank disk moves the front end of the bar in an elliptical path, the plane of which is slightly above that of the conveyor.

Not only does this bar move with a gathering motion, dragging coal to the conveyor, but it also rotates through 90 deg. This is accomplished by reason of the fact that 28 in. of the bar's rear end is turned to 2 in. in diameter and provided with rifled grooves $\frac{3}{4}$ in. deep on opposite sides. These grooves, which engage heavy pins, run straight along the bar except at their forward ends, where they follow a helical course for a sufficient distance to impart a 90-deg. rotation to the bar.

This twisting motion of the digger bar turns the "sickle" up when it reaches a position directly over the conveyor. This permits lump coal of good size to pass under the bar and reduces the likelihood of its dragging coal off the conveyor.

Actual conveyance up the tread plate is accomplished by two endless chains fitted with arms which extend 14 in. across the 18-in. plate. These arms are attached to the links of each chain at 36-in. intervals and are so arranged as to alternate with each other. Thus the arms are 18 in. apart as they move up the tread plate pushing coal to its top. Roller chain of 3-in. pitch is used on this conveyor.

Each conveyor arm is built of a $\frac{1}{2}$ -in. steel strap 3 in. wide lying on edge. Two pieces of this flat steel are placed approximately on the two sides of a right-angle triangle of which the chain forms the third side. A link attachment secures the two corners of the arm to the conveyor chain, and a certain amount of flexibility in the arm itself allows it to negotiate the sharp turn which the chain makes in rounding the sprockets at the ends of the conveyor.

MACHINE WILL CLEAN A WIDE AREA

A "machinery plate" which in shape resembles a wide T that lies flat on top of the truck, with the cross of the T at the forward end, forms the base of the entire machine. The rear end of the main conveyor pivots directly above the base of this T-shaped plate. Most of its weight rests on the cross of the T, on which a curved track is mounted. The forward end of the conveyor is supported on deeply grooved wheels running on this track and swings through its 16-ft. arc, enabling the machine to clean up a fairly wide area.

In practice the machine is moved up to the front of a fall of coal. One man with a crowbar easily swings the front end of the conveyor to the extreme left of its arc. The machine then begins work along the left rib. The traction motor crowds it into the pile of coal. As soon as the pile at that point is reduced so that the right-hand digger bar is doing the heaviest work the action of this bar tends to pull the end of the conveyor under the coal. By releasing a chain, a few inches at a time, the operator permits this swinging



The Machine is Merely Two Conveyors

The main conveyor can be swung through an arc of 16 ft. to clean up a considerable area. The rear belt with its riveted cross slats of iron always is in line with the car being loaded.

motion to proceed until the loader has swung through its full arc. A man with a crowbar then swings it back to the left, the machine is crowded forward again, and cuts another swath through the pile. Thus the operation is repeated. The inventor asserts that this machine can clean up a place so neatly that little or no hand shoveling is necessary.

Originally the machine was built with one continuous conveyor which flattened down at the back. However, Mr. Wilson soon concluded that there were many advantages in breaking the long conveyor into two separate sections. Not the least of these was the advantage of always having the tail end of the machine lined up



F. N. Wilson

Inventor of the Wilson chainloader

with the car to be loaded. Consequently the present machine has a flat delivery conveyor 8 ft. 6 in. long suspended from the rear of the loader frame. This conveyor is built up in a peculiar manner. A belt 30 in. wide is riveted to thin iron cross slats which are attached at their ends to roller chains of $\frac{3}{4}$ -in. pitch. Both the main and delivery conveyors move at a speed of 300 ft. per minute.

During the two years of experimentation that have passed since W. K. Kavanaugh, president of the Southern Coal, Coke & Mining Co., first saw a model of this machine operating in Mr. Wilson's basement in St. Louis many a "bug" in this loader has been eliminated. When the long tread plate of the main conveyor buckled it was made rigid by a long angle iron riveted underneath. When the conveyor arms snapped under the strain of revolving around the sprockets their design was changed. Spur-gear drives were replaced by worm gears working in oil. The main motor of 25 hp. was replaced by one of 7 $\frac{1}{2}$ hp., which appears to be ample. Over-all height was reduced by changing from 4-pole motors to 2-pole.

Other improvements followed one upon another until today the machine is able to stand considerable rough-and-tumble work though it is not yet ready for extensive commercial production. As this was written there also appeared to be some likelihood of patent infringement difficulties although the main patents covering the machine all have been allowed by the Patent Office, and their holders are ready to rise in their defence.

RENEWING THE SALT LOST IN PERSPIRATION.—In England, Professor Moss of the University of Birmingham, with the advice of Dr. Haldane, has made a study of the effects of chloride elimination during excessive sweating while working in high temperatures. He states that the addition of sodium and potassium chlorides to the drinking water materially lessens the muscular fatigue and prevents miners' cramps.

What Everyone in the Industry Should Know About Handling of Mining Machinery

Many Equipment Failures Due to Lack of Understanding of the Machines
—Devices Should Be Designed to Meet Mining Conditions— Proper
Performance Obtainable Only When Machinery Is Kept in Good Repair

BY T. F. MCCARTHY

Electrical Engineer, Indiana, Pa.

IN THE evolution of mining methods which has been rapidly taking place our industry has seen a marked increase in the use of machinery. Much of the equipment now used has been developed for special application to mining service but a far greater proportion of the equipment now commonly used in or about the mine has been adopted from other industries.

The application of mechanical and electrical machinery has been so rapid that few except those who have an intimate contact with it have a proper appreciation of its important characteristics; in fact, many of those who have direct supervision of its operation have been unable to give it the care and attention ordinarily required. Another disadvantage most engineers have realized is the fact that machines introduced from other industries do not always withstand the hard mine service.

In spite of these adverse conditions the application of machinery is rapidly expanding, and it is therefore becoming increasingly necessary that mining men become more thoroughly familiar with mechanical and electrical machinery if the best results are to be obtained. It also is important that many manufacturers of equipment for mine service design their product or revise their designs to meet mining conditions.

Mine superintendents, foremen and assistant foreman usually have direct supervision of the operation, care and repair of mining machinery and it is therefore important that they be sufficiently familiar with the equipment to know its limitations and be able to ascertain whether or not it fits the conditions and is being given proper attention and repair. In this connection there are three important points to be considered, namely: The equipment must be designed for the particular operating conditions, it must be operated within its rating and must be properly cared for and repaired.

The question of design is a problem that requires special attention. Often mine equipment must operate in very damp and dirty locations and under widely different conditions, all of which must be taken into consideration. It is particularly important that motors and other electrical equipment be designed to keep out moisture and dirt. Haulage, cutting and hoisting equipment are subject to very heavy overloads, and due consideration must be given to the rating and capacity of the motors and the design must be such as to withstand severe mechanical stresses. It is therefore important that those responsible for the purchase of mine equipment remember that the operating conditions, rating and quality of the apparatus should govern its selection rather than first cost.

Many equipment failures are due to the operation of machinery under conditions different from those for

which it was designed. Motors often are operated on circuits where the voltage is too high or too low, and to avoid failures from this cause one should remember that the voltage of a circuit should never vary more than 10 per cent above or below that stamped on the name plate. Pumps often are operated on heads above their rating or the suction or discharge pipes are smaller than the openings on the pump, yet they are expected to deliver their rated capacity. These conditions apply to all classes of mine equipment and where a machine or motor is continually breaking down an investigation usually will reveal the fact that some condition is not right for its successful operation.

The largest percentage of equipment troubles are due to faulty lubrication and dirt. Every piece of apparatus requires certain grades of lubricating oils and greases for the different bearings. The manufacturers of equipment will gladly recommend the particular lubricant to use on their machines and these recommendations should be closely followed. With motors, an over-supply of oil frequently is the cause of electrical trouble. The excess oil gets into the windings and spreads itself over the insulation of the wiring, field coils, armature and commutator bars, causing the insulation to break down and resulting in a short-circuit. Oil mixed with dirt serves as a path for current to leak, thus causing burned insulation.

Repairmen should be thorough in the inspection and cleaning of equipment. If the machines are cleaned of excess oil and dirt at every inspection it will be possible to eliminate a large percentage of the most common troubles.

Haulage locomotives are one of the most abused classes of mine equipment. Those in charge do not know their limitations and as a consequence they are given very little attention. Locomotives usually are operated over poorly kept tracks and the supply voltage often is much lower than that necessary for successful operation. Some motormen believe a locomotive should haul any size trip that can be coupled to it.

A locomotive is guaranteed to deliver a given drawbar pull at a rated speed provided the track conditions and the voltage of the circuit are correct. A modern locomotive can be relied on to deliver a drawbar pull equal to 25 per cent of its weight provided the wheels can obtain sufficient adhesion to the rail. The tractive force therefore is governed by the size of rail and condition of the roadbed. If locomotives are to be expected to deliver their rated drawbar pull, heavy rails should be used and the track should be well kept. With chilled cast-iron wheels it is the usual practice to consider the drawbar pull equal to 20 per cent of the weight of the locomotive, while with steel tires the drawbar pull will be equal to 25 per cent of the weight

of the locomotive. It is necessary then, if we wish to obtain best results from our locomotives, that the load attached to the motor shall not cause it to exceed its rating and that the proper voltage be maintained on the trolley circuit.

Where plain-bearing mine cars are used it is common practice to consider 30 lb. per ton as the friction load and 20 lb. per ton as the grade resistance. For example, let us suppose it is required to determine the number of cars a 10-ton locomotive will haul on a 2-per cent adverse grade where the mine cars are equipped with plain bearings and the total average weight of the loaded car is two tons.

With a proper size rail—which should not be less than 40 lb. per yard—and the rated voltage on the trolley circuit, the correct number of cars for the trip will be determined as follows: The drawbar pull of a 10-ton locomotive with steel tired wheels is 5,000 lb. The friction load of the 2-ton car at 30 lb. per ton is 60 lb. per car. The grade resistance load at 20 lb. per ton is 40 lb. per car; the total drawbar pull per car is therefore 100 lb. As the drawbar pull of the locomotive is 5,000 lb. it is apparent that it can haul a load equal to fifty cars each weighing two tons. As the locomotive weighs ten tons and is therefore equal to five 2-ton cars, it is capable of hauling only forty-five cars of this given weight on the 2-per cent grade.

OPERATE LOCOMOTIVE MOTORS WITHIN RATING

The motors in a locomotive usually are guaranteed to deliver their rated drawbar pull at a given speed with a temperature rise not exceeding 75 deg. C. or 167 deg. F. over a period of one hour. If the load exceeds the capacity of the locomotive and the haul is long, the temperature may exceed the safe limit and the insulation of the armature and field coils become overheated. To keep within the rating of the motors it is necessary that the duty cycle of the locomotive

be such that during periods when the locomotive is lightly loaded, coasting or standing, it will have time to cool off.

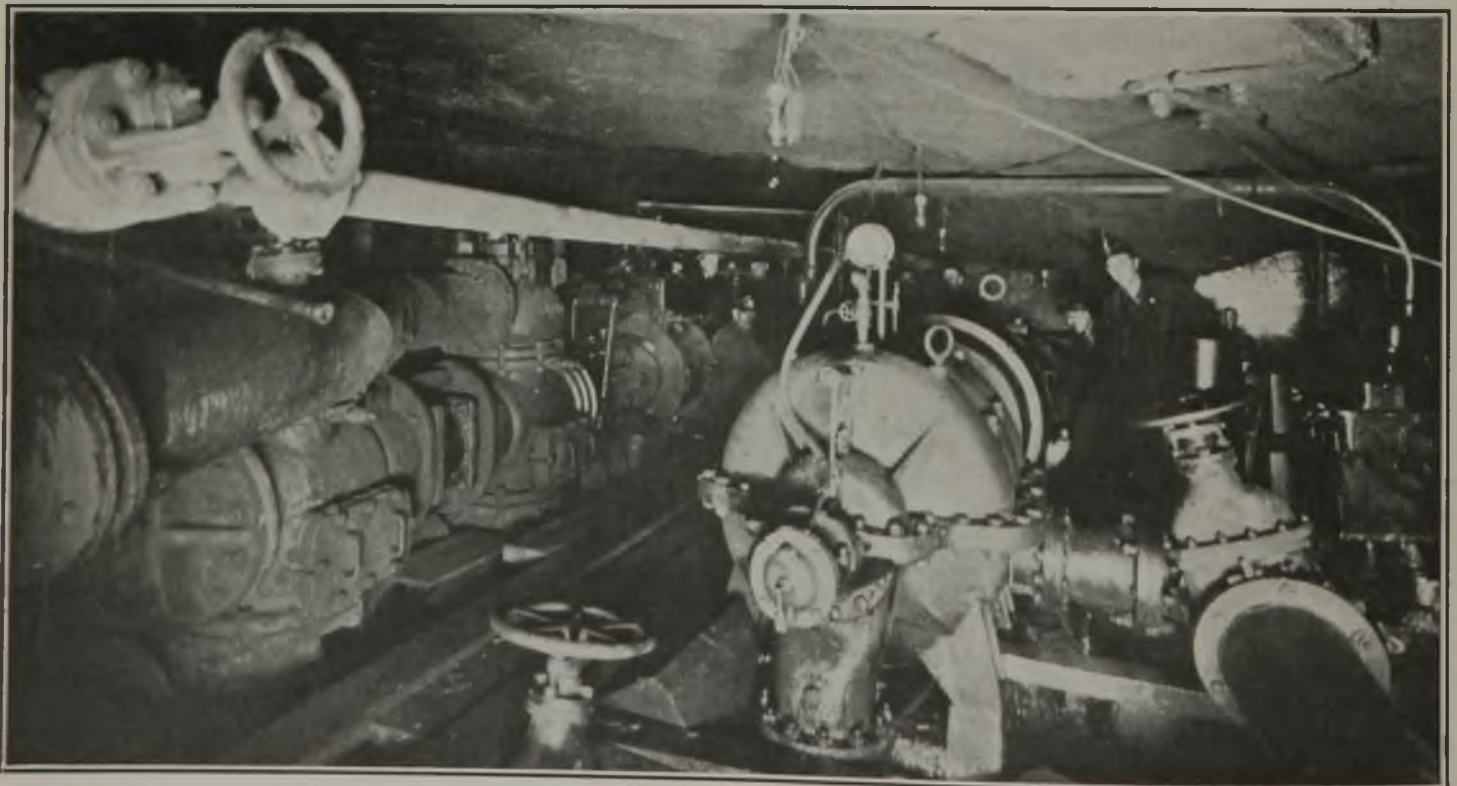
A 25-per cent overload on a motor will reduce the time the motor attains its maximum temperature from one hour to one-half hour and also cause a reduction in speed of approximately 10 per cent. If the haul is long and the locomotive overloaded and there is not sufficient time between trips for the motors to cool the result will be overheating and insulation failure.

Another cause of trouble from overheating is low voltage. A 10-per cent reduction in voltage will cause a reduction in speed of approximately 20 per cent, causing an increase in the time required to make a trip and resulting in overheated motors, increased power consumption and reduced output. Low voltage usually is found to be due to poor bonding and lack of sufficient copper in the trolley or feed lines.

Overloads increase the demand charge with a resulting increase in energy cost. Low voltage also increases the energy cost because when the speed of a locomotive has been reduced 50 per cent the power bill is doubled and the extra power has been wasted in overcoming the resistance of the track, poor bonds or overloaded feed lines.

The motors of modern locomotives are equipped with ball or roller bearings which require a special grade of grease. Great care should be given to see that the bearing housings are dustproof and that no dirt is working into them. Journals and axle linings also require a special grade of oil and the oil wells should be kept packed with a good grade of wool waste and the lids properly fitted to prevent sand and dirt working into them.

All driving-gear bearings should be kept reasonably tight so that the gears will mesh properly. Gear cases should always be installed and kept tight and the gears lubricated with a gear compound. Brake rigging and

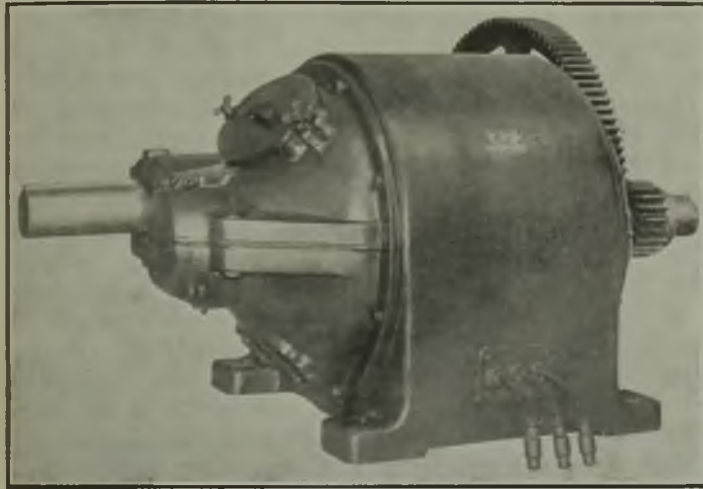


Underground Pumping

Some of the pumps used in the mines must be located in remote places, this is because the pump must be located where the water can be concentrated. Late developments in pumping machinery have resulted in odd looking pumping stations: motor-driven centrifugal pumps are sometimes seen with steam-driven reciprocating pumps.

shoes should be kept in perfect adjustment to prevent any possibility of accident.

Motor brushes require a certain amount of attention to see that they are seating properly and not sticking in the holders. Controllers should be inspected regularly and all fingers and segments that are burned or pitted should be promptly repaired and kept lubricated with a light coating of vaseline. The air gap between the motor armature and pole pieces should be regularly checked with a gage to make certain that the clearance is correct. Where compressed air is available it should be the practice to blow off all accumulations of sand and dirt at frequent intervals. This method of



Enclosed Type Motor

If manufacturers selling equipment to the mining industry would study the conditions under which their equipment must operate, far better success would be obtained. Enclosed motors will usually be much larger and more expensive than the open types but in many cases they would quickly prove more satisfactory.

cleaning is especially effective on the rheostat because it will clean off the grids and reduce the probability of short-circuits and grounds.

TWO TYPES OF PUMPING EQUIPMENT

Mine pumps may be divided into two types, reciprocating and centrifugal. When driven by means of an electric motor they are either direct-connected, belt driven or gear driven. The reciprocating type pump, either piston or plunger, generally is used for gathering purposes.

Whenever a pump is inspected the motor also should be inspected so as to be certain that the brushes are seating properly, are free in the holders and the winding and commutator are free from oil and dirt. If excessive sparking occurs at the motor it probably is caused by a dirty commutator, sticky brushes, open or short-circuited armature coils, partly short-circuited field coils or grounds. If any such defect is noted it should be given instant attention so that the source of trouble may be located.

The hand-operated or automatic starter also should be examined to see that it is functioning correctly and that all connections are tight. These starters have a definite purpose in the circuit, being used to accelerate the machine slowly, prevent excessive mechanical strains and also to prevent excessive starting current when the motor is connected to the line. Where hand starters are used the pumpmen or workmen often will tie the arm of the starter in the running position so that in the case of power failure they will not have to

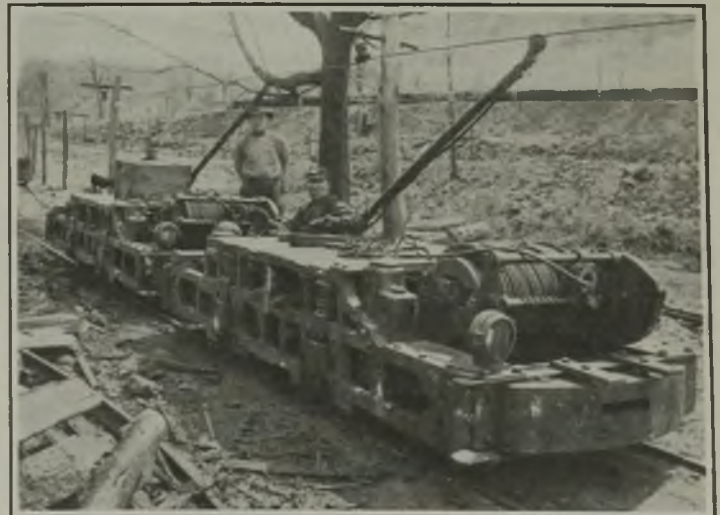
return to the starter to put the motor in operation when power is again on the line. Men should be reprimanded or discharged for doing this, as they are defeating the purpose of the starter and frequently cause serious material damage or injury to other workmen. All motors should be properly protected by fuses of a carrying capacity low enough to protect the motor in case of trouble; ordinarily the fuses should not be more than 50 per cent in excess of the full load current of the motor.

The packing on the pump rods, plungers and pistons should be regularly examined and tightened or replaced when required. When a packing gland is tightened the handiest nut to get at is often turned down and the other one left loose. This causes the packing to bind and the rod to be cut or scored.

When the pump fails to pick up its water the valves should be examined to see that they are seating properly and that all bolted connections and suction lines are free from air leaks. Efficient strainers on the suction pipe will reduce the possibility of particles of coal or rock being carried into the pump and preventing the valves from seating properly. The connecting-rod bearings should be tightened before a knock develops. Where mine water is especially bad the water ends of the pumps should be made of an anti-acid composition or lined with wood or cement; ordinary cast iron will not successfully resist the action of an acid water.

Centrifugal pumps should be used only on heads very close to that for which they are designed, for ordinarily they have the peculiar characteristic of overloading when the head is too low and of not delivering their full capacity when the head is excessive. They also require that the suction line be absolutely airtight and the pump and suction line be primed before being started.

In the inspection of a centrifugal pump care should be taken to be certain that all bolted connections and packing glands are free from air leaks. Bearings should be examined to see that the oil reservoirs are properly filled and that the oil rings revolve freely. The inside of the pump should be examined occasionally to see that the wearing rings on the rotor and casing have a minimum clearance, because excessive clearance will permit too much water slippage and the pump will not deliver its rated capacity. The openings in the rotor may become plugged up with coal or wood, and



Cable Reel Locomotive

A locomotive which may be repaired easily is always better than one which the repairmen must tear down to make adjustments or changes.

therefore should be cleaned. The thrust bearing should be closely inspected and adjusted.

Cutting machines are required to operate under very adverse conditions of voltage and load, and as the dust conditions usually are abnormal they will prove very expensive to maintain unless carefully operated and repaired. Lack of proper lubrication is a prolific source of trouble. Very often the machine runner neglects to oil the machine when required and puts in an over-supply at long intervals of time instead of using a small amount of oil at frequent intervals. These machines require special grades of lubricants for the different bearings and drives and require particular care to prevent dirt from entering the bearings.

The hardness of the coal being cut determines the speed of the feed on the machine, and if the load on the motor is to be kept within its rating and the mechanical stresses within safe limits, the cutting speed must be correctly proportioned to the load. Manufacturers of cutting machines furnish different ratio gearing for the different feeds required, which makes it possible to make the rate or speed of the feed such that the load is within the capacity of the machine at all times. The machine runner always should be supplied with a sufficient number of sharp bits so that the used bits may be replaced when dull. Many overloads and burned-out armatures are caused by machine runners attempting to cut with dull bits.

ENCLOSED MOTORS BEST FOR HOISTS

Room-hoist motors require the same careful inspection and adjustment needed by other electrical equipment and should be specially protected from dampness because they operate very intermittently. The most suitable motor for this class of work is the totally enclosed crane type. When hoists are operated by unskilled labor it is necessary to see that the controllers or starters are in good and safe condition and that the motors are not overloaded by the men attempting to haul too many cars or replace heavily loaded derailed cars on the track.

Mine cars represent one of the largest investments in equipment about the mine and as a rule are expected to remain in operation without attention until worn out or put out of service due to a wreck. As the condition of the cars largely governs the output of the mine they should be regularly inspected and repaired so that the trucks will always be in perfect alignment and the friction reduced to a minimum. Ball and roller bearings have considerable merit and undoubtedly reduce car friction and are worthy of careful consideration in buying new equipment.

PROTECT WIRE ROPE AGAINST CORROSION

Other items used about the mines, such as wire rope, electric cables, drills and other accessories to mine equipment represent a considerable investment and their correct use is an important consideration in the successful operation of the mine. All wire rope used on cutting machines and hoists should be protected from corrosion by the application of a rope preservative or compound.

Trailing electric cable on cutting machines, cable-reel locomotives and other machines should have an insulation constructed so as to resist abrasion and moisture. Cables with molded rubber covering have proved quite successful for this service.

The Miner's Torch

Seeing Things

MAGAZINE and newspaper editors have an idea, I am told, that technical men are not competent to write descriptions dealing with plants or processes with which they are well acquainted, the argument being, of course, that they might leave out several important links in the narrative without realizing that the average layman cannot jump the gaps that are left. Since I class myself a "technical man," I might be accused of violating the proprieties if I questioned the editors' judgment in the matter, but by way of countering the accusation, I want to go on record as saying that the average layman or laywoman attempting a description of a plant or industry with which he or she is not familiar generally spoils the picture by saying too much. They do not leave any gaps to jump largely because they fill in all of the gaps with their own imaginings.

The January issue of *Success* magazine has an article which illustrates the point I am attempting to make. The article gives the impressions of a woman investigator who was sent to Alabama to investigate the operations of the Steel Corporation around Birmingham.

She describes what she saw and does it well, then she proceeds to tell about conditions as they were in the past, not as she saw them, of course, never having been in Alabama before, but as they were described to her by others. And you are left with the impression that all of the changes for the better date back only to the year 1907 when the Steel Corporation took charge of the properties.

I am sure that no one connected with the Steel Corporation consciously intimated that the mines in Alabama in 1907 were veritable hell holes and then overnight as they changed ownership or even in 16 years were transformed to their present state. Also I feel sure that the author of the article did not bring in these contrasts as overnight transformations just to make the article interesting but the result nevertheless is to make you doubt the accuracy of the entire description, and some might even wonder if the article was not inspired by the Corporation.

The conditions which she refers to as conditions of the past are not greatly exaggerated, and had the author only realized and made her readers realize that by past was meant thirty-five or fifty years ago, when the mines were first opened and that in a state where mining had never been carried on before, the impression made by her narrative would have been quite different.

The mining industry is in need of all of the publicity it can get; many of the editors and the politicians who take such delight in saying hard things about our mines and miners do not know that our country is filled with mining camps where the men and their families are well housed and otherwise treated as human beings—just as in the mining camp described in the article under discussion. What a pity then that the crude conditions of thirty-five years ago had to creep into the narrative to take hold of the reader's imagination.

I am reminded of the old saying that runs something like this: "It takes four very live men to carry out one dead man."

Valley Coals of Virginia Present Unusually Difficult Operating Conditions

Beds Are Located in Pocono Measures—Seams in Places Pitch so That Floor of Seam Is Higher Than Roof—As a Result of Pressure and Faulting Coal Often Is Badly Crushed

GEOLOGICAL conditions make the operation of the seams in Montgomery, Pulaski and Wythe counties, in Virginia, known as the Valley coal field, difficult to work and hard to clean. It also has crushed the coal. The seams are in measures below those of even the Pocahontas field, which lies a short distance to the north and west of the Valley region.

The coal beds of the region occur in the Price formation, the basal measures of the Carboniferous system, and they are therefore much older than the coal beds that lie farther northwest. The Price formation is of about the same age as the Pocono sandstone. Beds of this age carry coal in many parts of the northern Appalachian region, but, so far as known, they do not contain it in commercial quantities north of the Potomac River. Most of the beds that can be operated are limited to the counties of Virginia just named.

Montgomery County—In this county the coal lies in two distinct fields, as shown in Fig. 2, the Brushy Mountain field (A) on the north and the Price Mountain field (B) on the south. In the Brushy Mountain field only one bed (the Merrimac or "Big Bed") is generally of workable thickness. This bed extends entirely across the county on the south slope of Brushy Mountain. It dips to the southeast from 20 to 40 deg.

This coal, though locally much crushed, is generally workable from the New River eastward to a place about a mile beyond the Blacksburg-Newport road, but east of this place it has been crushed by movements within the crust of the earth, and in some places has been crowded into thick pockets and in other places almost squeezed out. Where the Merrimac bed is workable its thickness ranges from 5 to 9 ft., but it is broken by many bony partings, which are difficult to separate from the coal and which, if not removed, help to swell its already large percentage of ash.

COAL BEDS ARCH UPWARD TOWARD PRICE MOUNTAIN

The mine of the Superior Anthracite Coal Co. (5), which is a mile back from the river, at the station of McCoy, on the Virginian Ry., is the only one in the Brushy Mountain field that has direct railroad connection. In the autumn of 1923 four other mines—the mine of Linkous & Kipp (4), the College mine (3), the mine of the Diamond Coal Co. (2a), and the mine of the M. J. Shusser Coal Co. (3)—were working in a small way and trucking their output to Blacksburg for local consumption or for shipment on the railroad. Recently the A. Dunphy Coal Co. has begun operations on the property just south of that operated by the College mine (3).

The Price Mountain coal field (B) lies west of the road between Blacksburg and Christiansburg and com-

prises an isolated area of the Price formation that is entirely surrounded by the Valley limestone. Price Mountain, a small ridge about three miles long, has been formed by the arching up of the Price formation, so that the coal beds dip away from the axis of the arch in all directions and, in general, the accompanying beds of limestone dip correspondingly away from the mountain.

The dip of the coal beds on the south side ranges from 20 to 35 deg. and on the north from 30 to 50 deg. At some places on the north side the coal bed stands nearly vertical, and in some of the old mines it is reported to have been overturned so as to dip steeply toward the south.

As the beds of limestone and the coal bed have about the same degree and direction of dip, the coal bed obviously passes beneath the limestone in most directions, but the extent of the coal bed beneath the limestone is not known. As the coal bed in Price Mountain dips to the north and the same bed in Brushy Mountain dips to the south the logical conclusion is that the coal is continuous under the limestone from one outcrop to the other, but this assumed continuity can be proved only by drilling.

In general the limits of the coal fields of Montgomery County are determined on one side by the outcrop of the coal bed and on the other by the depth to which mining can be profitably carried. If 2,500 ft. is assumed to be the vertical depth to which mining can be made profitable, and if the dips range from 20 to 30 deg., then a strip of country ranging in width from three-quarters of a mile to 1½ miles may be regarded as containing minable coal. If the dip flattens with increase of depth the width of the belt of available coal will be increased.

This belt of available coal along Brushy Mountain is continuous across the county except in areas where the coal is crushed, but the coal in Price Mountain is limited mainly to its north and south sides, for at its ends the coal bed has been greatly crushed and faulted.

MERRIMAC MINE CONNECTS WITH TWO RAILROADS

Much coal has been mined in Price Mountain, but most of the mines have been small, and they have not extended any considerable distance beyond the drainage level. Only three mines are now in operation. The Merrimac mine of the Merrimac Anthracite Coal Corporation (6) is the largest and is the only one in the field that has direct railroad connection. It is favorably located for transportation, for it is on the south side of the mountain and has connections with both the Norfolk & Western and the Virginian railroads. The coal bed in this mine is from 5½ to 7 ft. thick and this thickness is typical of the bed on the Price Mountain field. The mine of the Brunfield Coal Co. (7) also is on the south side of the mountain, but it is small and its output is trucked to the railroad,

NOTE—This article is written from facts supplied by the U. S. Geological Survey. Wherever not declared to be based on report, the measurements given are those actually obtained by the geologists in charge of the Survey. A prior article, entitled "Can the Valley Coal Fields of Virginia Compete with Those of the Anthracite Region," appeared in the issue of Feb. 21 on pages 269-271.

half a mile distant. On the north side of the mountain a small wagon mine of the Eureka Coal Co. (8) supplies fuel for local consumption.

Pulaski County.—The coal fields of Pulaski County, as shown on the map (Fig. 2), consist of the Little Walker Mountain and the Pulaski fields.

The Little Walker Mountain field (c) is the south-westward continuation of the Brushy Mountain field of Montgomery County. The coal beds naturally extend from one field into the other, but the Merrimac bed appears to thicken to the west. The increase in thickness is generally believed to be due in large part to the greater number and increased thickness of the partings. The Langhorne bed ("Little Bed"), which normally lies 20 to 70 ft. below the Merrimac bed, also increases in thickness to the west and becomes 3 to 5 ft. thick in the western half of the Little Walker Mountain field. As this bed contains no bony partings its increase to workable thickness makes it very valuable, especially as its coal is somewhat harder than the average coal in the Merrimac bed.

The structural conditions in Pulaski County are much the same as those in Montgomery County except that

the coal beds dip more steeply, the dip ranging from 35 to 50 deg. Because of this increase of dip the width of the belt of available coal is narrow, only slightly exceeding 2,500 ft. in horizontal distance, which also is the limit of depth.

Two mines with railroad connections are operating in the Little Walker Mountain field—the Parrott mine of the Pulaski Anthracite Coal Co. (9), on the Norfolk & Western Ry. and the New River, and the mine of the Empire Anthracite Coal Co. (10), at the foot of Brushy Mountain, which connects with the same road at Pulaski, seven miles distant. The coal from the Empire mine (10) is hauled by tram to the breaker at Pulaski over part of an old railroad built many years ago by the Bertha Mineral Co. to their Altoona coal mine (11), about two miles west of the Empire mine. The Parrott mine (9) is operating in the Merrimac bed and the Empire mine (10) in the Langhorne bed.

COAL OUTCROP BENDS SHARPLY TO SOUTH

A short distance west of the old Altoona mine the outcrop of the coal bed leaves the slope of Brushy Mountain and turns sharply toward the east on the north

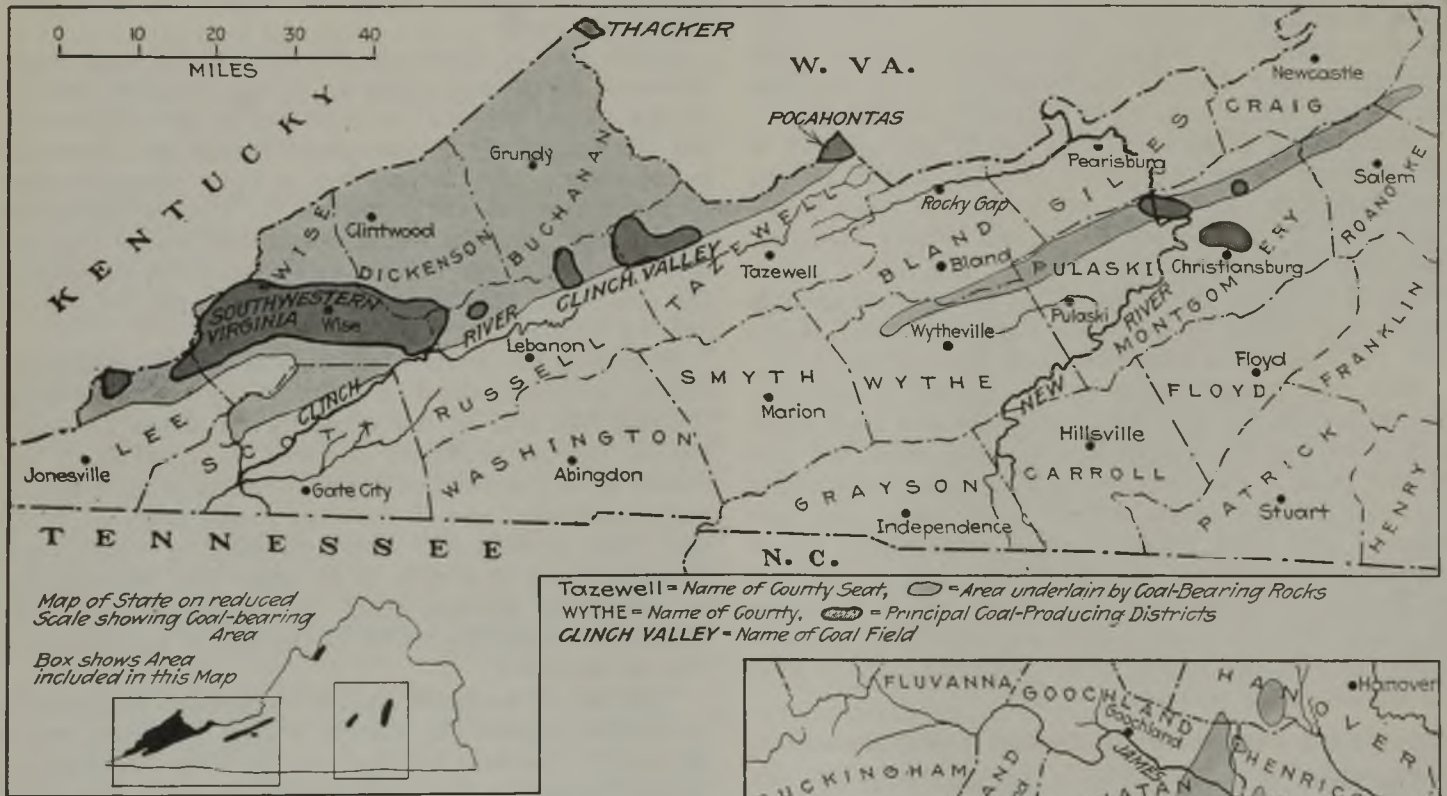


Fig. 1—Maps of Two Coal Fields of Virginia, the Eastern and the Central

The map of the Eastern area prepared some years ago by the U. S. Geological Survey, before the Valley coal beds had been given a close examination shows in a generalized way the areas they occupy. As will be seen in Figs. 2 and 3, greater detail is now at hand. The maps with the key sketch above this title exhibit somewhat completely the coal-bearing areas of the State of Virginia. In 1922 Wise County produced 5,022,866 tons; Russell County, 2,070,574 tons; Tazewell County, 1,563,847 tons; Dickenson County, 870,234 tons; Lee County, 762,305 tons; Montgomery, 42,194 tons. All the rest together—there are no separate returns available—totaled 106,281 tons. The price of the Montgomery coal, \$4.34 per net ton, led that of all other listed counties. Wise County coal sold for \$2.43; Russell coal, for \$2.51; Dickenson, for \$2.59; Lee, for \$2.68, and Tazewell for \$2.90. The price in the other counties averaged \$4.09 and the whole state railroad product \$2.57. This is evidence that certain at least of the Valley coals have a high market value.



face of Tract Mountain. The point at which the outcrop makes this sharp bend is arbitrarily taken as the western end of the Brushy Mountain field, and the area that lies east of this point is here called the Pulaski field, because the outcrop at its other extremity passes through the town of Pulaski.

Little mining has been done in the Pulaski field and few prospects can be found. The Merrimac bed is reported to be 12 or 15 ft. thick in an old mine two miles north of Pulaski, but the report could not be verified. Only one small mine is now operating in this field on the Merrimac coal bed. This mine is just south of Pulaski and is operated by the High Carbon Coal Co. The coal bed in this mine has a thickness of 7 ft., including the customary bony partings.

Wythe County.—There are two separate and distinct coal fields in Wythe County—one in the vicinity of Max Meadows, which will be called the Max Meadows coal field, and the other along the south slope of Brushy or Little Walker Mountain (C), on the headwaters of Reed Creek, which will be called the Reed Creek coal field (F).

The Max Meadows field is different from any of the fields so far described, as it consists of a rather flat synclinal trough six miles in length, extending from Gunton Park or Clark Summit on the east to the west fork of Miller Creek, about 2½ miles northwest of Max Meadows. A sketch map of this field is given in Fig. 2.

Only a little mining or prospecting has been done in this field, and consequently but little is known of the

coal beds except those in the vicinity of Gunton Park, where a mine recently was opened about a mile west of the railroad by the Pulaski Smokeless Coal Co. (12). The coal bed in which mining is now carried on apparently is the highest workable bed in the formation and is therefore called locally bed No. 1. This bed, where sampled by the geologists, is 5½ to 6½ ft. thick and has several partings. It dips only about 25 deg. to the south, but this dip is not uniform, as several rolls and irregularities of dip are shown in the mine slope.

COAL BADLY CRUSHED AND PROBABLY BUNCHED

Recently a tunnel was driven through the rock floor a distance of 12 ft. to a large but considerably crushed and distorted coal bed, which apparently is more than 20 ft. thick and carries 15 or 16 ft. of coal. The measurements given here, however, are not reliable, as the entry cut the coal bed in a roll and the coal as well as the partings in the bed are much disturbed and possibly bunched, so that probably the bed appears to be thicker than it really is. This bed is called No. 2. In addition to beds Nos. 1 and 2, there is another bed which, according to apparently reliable witnesses, lies not more than 20 ft. below bed No. 2 and contains at least 4 ft. of clean coal. This bed is known as No. 3.

A bed that seems to be bed No. 1 was prospected several years ago near the railroad, and beds of this group also were prospected about 1½ miles west of the mine of the Smokeless Coal Co. Probably the most satisfactory prospecting on these beds has been done

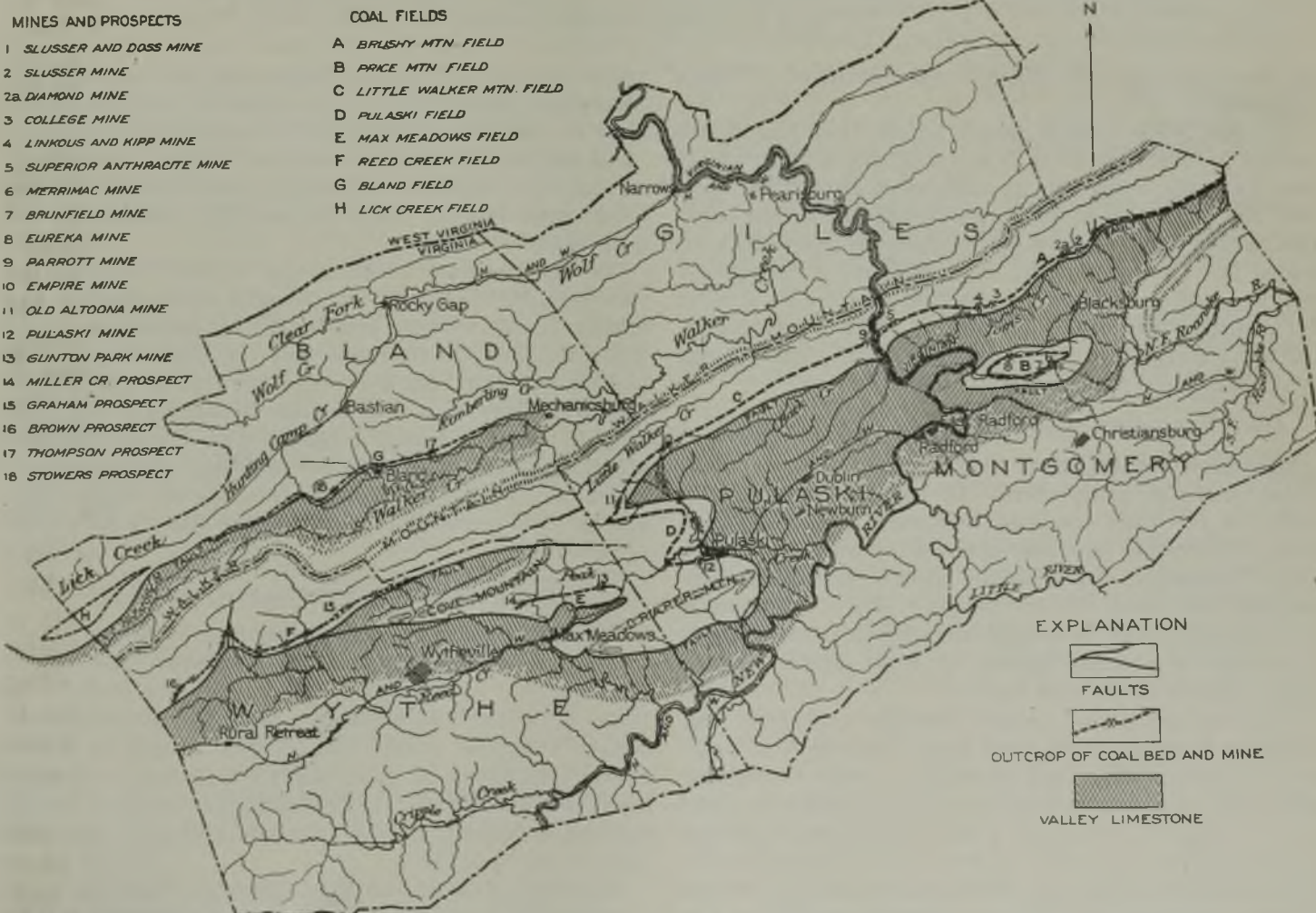


Fig. 2—Valley Coal Fields in Montgomery, Pulaski, Wythe and Bland Counties, Virginia

From the west corner of Bland County, near Lick Creek, to the most easterly corner of Montgomery County is 71½ miles. The area of the fields probably is large but the steepness of the dip soon carries the coal

to such profound depths as to make the coal unworkable, and its badly crushed condition makes the operation of some of it of questionable advantage. Other areas are extremely high in ash, and in fact in

all areas excessive ash is found. However, each operating area must be considered in detail and as yet none too much is known of the possibility of removing ash by washing, flotation and tabling.



Fig. 3—Max Meadows Coal Field with Section Showing Form of Syncline

This area is noteworthy for its overturned measures, which will make mining difficult. The depth of the coal at the deepest point probably is not greatly in excess of 1,000 ft. and it is doubtless nearly flat over a large area at the bottom of the basin. Apparently there is no coal under the Valley limestone, which, as in Fig. 1, is hatched to delimit its area.

on the west fork of Miller Creek northwest of Max Meadows.

At this place a 40-ft. shaft shows that bed No. 3 ranges in thickness from 3 to 10 ft., the greater thickness probably being due to movement within the coal. Bed No. 2 is exposed 20 ft. above bed No. 3, but could not be measured because the timbers in the shaft concealed it. Good coal 5 ft. thick is found in a near-by opening, and the bed in the shaft appears to be at least 7 ft. thick. Bed No. 1 lies 15 or 20 ft. above No. 2. On the outcrop bed No. 1 ranges in thickness from 6 to 5 ft., but it contains many bony partings.

COAL BEDS APPEAR TO END NEAR MAX MEADOWS

The westward extent of these coal beds is not definitely known by prospectors. The opinion is commonly held that the beds continue westward as far as Cove Creek, where they are overlapped and concealed by the Valley limestone, but this is improbable, for a few hundred feet west of the prospect shaft the outcrop of a sandstone can be traced underlying the coal until it assumes a position almost at right angles to the general strike of the coal beds.

This feature shows clearly that the coal beds end here in a synclinal point, and their outcrop, if it could be traced, would turn back to the east in the overturned south limb of the syncline and connect with the prospect on Miller Creek, half a mile below the forks of the creek.

The geologic structure of the northern part of the syncline is simple, as is shown by the regularity of the outcrop of the coal beds from one end of the basin to the other and by the regularity of the band of red shale (Maccrady formation) that occupies the middle of the trough. A rough measurement of the thickness of the

rocks that lie between the uppermost coal bed and the Maccrady shale south of the mine of the Smokeless Coal Co. is about 1,000 ft. The belt of red shale can be clearly seen from the forks of Miller Creek downstream for a distance of about 1,500 ft. and on the direct road leading from Gunton Park station to the coal mine.

As the Maccrady shale is the highest formation in this trough, its outcrop must mark approximately the middle of the trough, and hence the deepest part. If the coal lies 1,000 ft. below this red shale, it probably is at about that depth below the surface, and as the red shale here dips only about 10 deg., the coal bed directly beneath must lie nearly flat. These features afford a means of making an estimate of the area of available coal, for the trough is about six miles long, and the coal probably is workable for about a mile back of the outcrop.

BEDS VERTICAL AND PERHAPS OVERTURNED

From the southernmost boundary of the red shale southward the rocks are much disturbed, and where they are well exposed they dip steeply to the south or stand in a vertical position. This relation indicates clearly that the south limb of the trough is either sharply upturned or completely overturned, as can be seen on Miller Creek. If this condition prevails it does not look promising for the mining of coal in the south limb of the syncline.

The cross-section on Fig. 3 shows that the coal-bearing rocks on Miller Creek lie in a syncline whose southern limb is sharply overturned. Devonian rocks are exposed beneath the Price formation in Brushy Mountain, on the north edge of the field, and the same rocks, though much crushed and distorted, are exposed

also at the entrance of the gorge of Miller Creek, about a mile north of the railroad at Max Meadows. At both places these rocks dip to the south, but in the outcrop nearer the town they are overturned, as shown on Fig. 3.

Reed Creek Field.—The Reed Creek field (F) includes a rather narrow belt of outcrop of the Price sandstone along the south slope of a ridge known as Little Walker Mountain or Brushy Mountain. Because this field lies on the flank of the same ridge that carries coal in Montgomery and Pulaski counties many think that it is the westward extension of the Little Walker Mountain field (C).

The Little Walker Mountain field of Pulaski County ends in a synclinal point near the old Altoona coal mine, and the conglomerate that forms the lowermost bed of the Price formation has been traced definitely to an end on Little Walker Mountain, near the head of Crockett Cove. The Price formation comes in again near the Wytheville-Bland road, probably by the westward plunge of the synclinal axis, and there is a distinct interval in Crockett Cove, on Little Walker Mountain, in which there are no Carboniferous rocks.

Although the Price formation is exposed in Crockett Cove east of the Bland road, no signs of coal appear nearer than a point about a mile west of this road. Here the coal has been opened on the head of Goose Creek within 100 ft. of the edge of the limestone, which, as shown in Fig. 2, is faulted against and upon it.

BED 13 FT. THICK AND PITCHING 45 DEG.

From the prospect noted above the outcrop can be followed westward by means of old prospects in almost every ravine, but the coal is exposed at only a few places. Recent work done on a prospect belonging to Dr. John P. Graham, northwest of Queens Knob, where the coal bed dips 45 deg. south, has produced a considerable stockpile, and an analysis of a selected sample of this coal is given in the article entitled "Can the Valley Coal Fields of Virginia Compete with Those of the Anthracite Region?" which appeared in last week's issue of *Coal Age*, but the percentage of ash in this analysis probably is much less than it would be in a sample representing the entire bed. Doctor Graham reports that at the lowest point attained in the prospect the coal bed has a thickness of 13 ft., between well-defined walls. Unfortunately the prospect is caved, and the coal bed can no longer be seen.

West of Reed Creek the old prospects are in bad condition, and at only one locality, near the western extremity of the outcrop, was it possible to see the coal in place. At the C. C. Brown prospect, near the head of Mudlick Creek, a measurement shows that the coal bed becomes thinner toward the west, and a sample of coal obtained at this place indicates that it is of poorer quality than that to the east.

At the head of Mudlick Creek the outcrop of the coal bed swings to the south and is cut off or concealed by the fault. No coal is reported from places west of this locality, though the lower part of the Price formation outcrops nearly as far west as Bear Branch, 5 miles east of Marion.

In this field the movement thus produced within the coal bed has ground much of the coal nearly to powder and crowded some of it into great masses or squeezed it out altogether.

Bland County Field.—The coal beds of Bland County crop out in a narrow belt on the south slope of Brushy

Mountain. The coal beds continue southwestward into Smyth County.

In the Bland field the coal crops out at many places, but the coal beds seem to be thin and to have many partings. Two samples that were analyzed contained nearly 50 per cent of ash, and therefore they cannot be considered a source of fuel either now or for a long time to come.

Other Fields.—Coal beds of the same geologic age as those just described are found in other counties of Virginia, but most of them are so thin and so poor in quality that they are at present valueless.

Carnegie Institute Will Investigate Coal-Mining Problems

Studies of certain practical details of coal-mining practice will be conducted by six fellows to be appointed by the Carnegie Institute of Technology, Schenley Park, Pittsburgh, Pa. They are part of the co-operative mining courses of that institution in which the Pittsburgh Experiment Station of the U. S. Bureau of Mines and an advisory board of mine operators and engineers collaborate. The fellowships, which carry an emolument of \$750 a year of ten months' duration, are open to the graduates of colleges, universities and technical schools who are properly qualified to undertake research investigations.

Four of the fellowships are financed by the Carnegie Institute of Technology and two by coal-mining companies of western Pennsylvania. The following subjects have been suggested for investigation:

(1) GEOLOGY—(a) Correlation of coal seams by microscopic characteristics; (b) Colloid chemistry and the constitution of coal; (c) Microscopic study of the coking constituents of coal.

(2) ACID MINE WATERS—(a) Selection and performance of equipment for handling such water; (b) Action of such water on concrete and protective linings; (c) Analytic test for corrosion.

(3) COAL MINING—(a) Efficiency on blasting coal; (b) Possible substitutes for wood in mine timbering; (c) Friction losses and efficiency in mine ventilation.

(4) COAL WASHING—(a) Wet and dry methods; (b) Utilization and disposal of washery waste.

(5) UTILIZATION OF COAL—(a) Smithing qualities of coal; (b) Determination of comparative rate of carbonization of gas coals; (c) Combustion of low-volatile bituminous coal in house-heating furnaces.

(6) SAFETY AND EFFICIENCY—(a) Electric trailing cables used on portable motors and reel locomotives; (b) Carbon-monoxide indicators and their adaptability for mining and metallurgical uses; (c) Efficiency of dust-collecting instruments; (d) Rock dusting; (e) Humidification of mine air.

(7) COAL STORAGE—(a) Laboratory tests of relative tendency of coals to fire spontaneously; (b) Effects of size on deterioration in storage; (c) Maximum safe storage temperature.

(8) MINE EXPLOSIONS—(a) Modification of Stoke's law for settling of coal dust; (b) Time-pressure relations in dust explosions; (c) Conductivity and specific heat of coal; (d) Static charges in coal mines; (e) Effect of electric field in propagation of explosions.

The fellowships will begin Aug. 18, and applications must be made prior to May 15.

Is Your Tax Bill Too Heavy?

Your Taxes May Be Much Reduced if Higher Than Those of Companies Having Like Earnings

A Heavy Tax on Low Production May Put a Coal Operator at Great Disadvantage—The Unfair Impost May Be Due to Excessively Large Loans, Low Valuation of Property or Other Abnormal Conditions

BY GEORGE C. WILLIAMS*
Tax Consultant, New York City

MANY coal-mining companies have greatly overpaid their federal profits taxes in 1917 and subsequent years through lack of knowledge of the special relief provisions of the various revenue acts. As a result these companies are placed at a serious disadvantage in competing with representative concerns.

In support of the contention that such undue payments have been made tax data on a few coal companies have been listed in Table I, the figures being drawn from the 1917 statistics on coal-mining companies as prepared by the Bureau of Internal Revenue and found in Senate Document No. 259, Corporate Earnings and Government Revenues, Pages 130-133, inclusive. This table not only indicates the gross disproportion between the profits taxes paid by representative coal companies but also the fact that unless the concerns paying the higher rates of profits tax are granted relief under the special relief provisions exceptional hardships will be imposed.

TABLE I—TAXES PAID 1917 BY TWENTY SELECTED COAL MINING COMPANIES

No.	Code No.	Net Income	Total Tax	Total Tax to Net Income, Per Cent
1	38	\$35,751	\$5,122	14.33
2	142	35,978	20,545	57.10
3	190	50,449	8,038	15.93
4	6	50,900	27,870	54.75
5	97	78,835	14,250	18.08
6	267	79,657	46,382	58.23
7	72	86,710	20,746	23.93
8	208	84,944	50,436	59.38
9	107	107,676	17,851	16.58
10	219	104,109	59,657	57.30
11	77	171,553	40,360	23.53
12	19	177,395	106,795	60.20
13	214	288,789	72,245	25.02
14	232	271,944	154,243	56.71
15	67	377,762	128,072	33.90
16	253	360,328	198,953	55.21
17	36	526,778	128,849	24.46
18	250	541,722	301,592	55.67
19	62	666,220	211,550	31.75
20	157	612,358	311,370	50.83

In analyzing the foregoing table many questions arise, among which are: (1) Why does Company No. 2 pay four times the tax paid by Company No. 1 on a similar income? (2) Why should Company No. 18 pay over one hundred fifty thousand dollars more than

Company No. 17? (3) Is there any way under the tax laws that Companies No. 2 and No. 18 can obtain relief from their excessive taxes?

Some of the reasons why Companies No. 2 and No. 18 pay excessive taxes and the means by which they can obtain relief from this exceptional hardship will be discussed in detail in the following paragraphs.

Briefly, a domestic concern, in order to be entitled to relief under these special provisions, must prove either: (1) That its invested capital cannot be determined; or, (2) That its profits tax, if determined without the benefit of the relief sections, would, owing to "abnormal conditions" affecting its capital or income, work upon it an exceptional hardship by reason of having to pay a profits tax that is in excess of the average profits

tax paid by normal representative concerns.

The average profits tax is determined by comparison with representative concerns. The following example outlines in a general way the method of arriving at the average tax.

Assume Company A has a net income of \$100,000 and pays a profits tax under Section 326 of \$65,000. Abnormal conditions have been proved under Section 327. Companies B, C, D, E and F each have an average net income of \$100,000 and an average tax of \$40,000—ratio 40 per cent. The tax of Company A under Section 328 would be 40 per cent of its net income, which is \$40,000.

Special relief may be obtained for the taxable year 1917 under the provisions of Section 210 of the Revenue Act of Oct. 3, 1917, and for the taxable years 1918-1921, inclusive, under the provisions of Sections 327 and 328 of the Revenue Acts of 1918 and 1921. The special relief provisions are alike in the different revenue acts except for slight differences which are not material in the coal-mining industry. Sections 327 and 328 of the Revenue Act of 1921 read as follows:

Sec. 327. That in the following cases the tax shall be determined as provided in Sec. 328: (a) Where the Commissioner is unable to determine the invested capital in Sec. 326; (b) In the case of a foreign corporation or of a corporation entitled to the benefits of Sec. 262; (c) Where a mixed aggregate of tangible property and intangible property has been paid in for stock or for stock and bonds and the Commissioner is unable satisfactorily to determine the respective values of the several classes of property at the time of payment, or to distinguish the classes of property paid in for stock and for bonds, respectively;

*Formerly assistant chief of special assessment section, Natural Resources Division of the Internal Revenue Bureau.

(d) Where upon application by the corporation the Commissioner finds and so declares of record that the tax if determined without benefit of this section would, owing to abnormal conditions affecting the capital or income of the corporation, work upon the corporation an exceptional hardship evidenced by gross disproportion between the tax computed without benefit of this section and the tax computed by reference to the representative corporations specified in Sec. 328. This subdivision shall not apply to any case (1) in which the tax (computed without benefit of this section) is high merely because the corporation earned within the taxable year a high rate of profit upon a normal invested capital, nor (2) in which 50 per centum or more of the gross income of the corporation for the taxable year (computed under Sec. 233 of Title II) consists of gains, profits, commissions, or other income, derived on a cost-plus basis from a government contract or contracts made between April 6, 1917, and Nov. 11, 1918, both dates inclusive.

Sec. 328. (a) That in the cases specified in Sec. 327 the tax shall be the amount which bears the same ratio to the net income of the taxpayer (in excess of the specific exemption of \$3,000) for the taxable year as the average tax of representative corporations engaged in a like or similar trade or business bears to their average net income (in excess of the specific exemption of \$3,000) for such year. In the case of a foreign corporation or of a corporation entitled to the benefits of Sec. 262 the tax shall be computed without deducting the specific exemption of \$3,000 either for the taxpayer or the representative corporations.

In computing the tax under this section the Commissioner shall compare the taxpayer only with representative corporations whose invested capital can be satisfactorily determined under Sec. 326 and which are, as nearly as may be, similarly circumstanced with respect to gross income, net income, profits per unit of business transacted and capital employed, the amount and rate of war profits or excess profits, and all other relevant facts and circumstances.

(b) For the purposes of subdivision (a) the ratios between the average tax and the average net income of representative corporations shall be determined by the Commissioner in accordance with regulation prescribed by him with the approval of the Secretary.

(c) The Commissioner shall keep a record of all cases in which the tax is determined in the manner prescribed in subdivision (a), containing the name and address of each taxpayer, the business in which engaged, the amount of invested capital and net income shown by the return, and the amount of invested capital as determined under such subdivision. The Commissioner shall furnish a copy of such record and other detailed information with respect to such cases when required by resolution of either House of Congress, without regard to the restrictions contained in Sec. 257.

Under Sec. 210 of the Revenue Act of 1917 and Sec. 327(a) of the Revenue Acts of 1918 and 1921 a concern's profits tax liability should be determined under the provisions of said sections where the statutory invested capital cannot be determined. This condition may arise where through defective accounting or lack of adequate data the statutory invested capital cannot be determined.

Under Sec. 327(d) a large number of coal-mining corporations are entitled to special relief. In order to obtain relief under this provision a corporation's profits tax liability must (1) be in excess of the average profits tax paid by representative corporations similarly circumstanced; (2) impose an exceptional hardship on the corporation by reason of its having to pay a profits tax that is in excess of the average profits tax paid by representative concerns; and (3) be

excessive due to the existence of abnormal conditions.

(1) It is obvious that to obtain relief under the special assessment provisions a corporation's profits tax liability must be in excess of the profits tax paid by representative concerns. As a general rule if a corporation's profits tax is excessive it is not a difficult matter to determine the abnormalities causing the excessive tax, and to obtain special relief.

It is not essential to submit with the application for special relief data showing the average profits tax of representative concerns. Such data if available, however, will give the taxpayer some idea as to whether his tax is excessive and also aid the Income Tax Unit in arriving at the average tax.

In order to determine whether a concern's profits tax liability is in excess of the average tax of representative concerns, an analysis should be made of available statistics of representative competing concerns. Each case must be considered separately and no general rules can be laid down. The following example illustrates one of the many ways of determining an excessive profits tax rate:

Assume that Company A has an annual output of 100,000 tons of coal and has 500,000 tons of coal reserves. The cost value of the coal reserves at \$1 per ton would give Company A an invested capital of \$500,000.

Companies B, C, D and E, representative competitors of A, also mine an average of 100,000 tons a year, but they have average coal reserves of 2,000,000 tons that cost \$2,000,000. The cost value of the coal reserves would give B, C, D and E an average invested capital of \$2,000,000.

It is apparent that A's competitors obtain the benefit of a larger capitalization and as a result pay a much lower profits tax, for the reason that a larger invested capital results in a lower profits tax.

(2) The profits tax as determined under Sec. 326 must impose an exceptional hardship. The term "exceptional hardship" as used in Sec. 327(d) means the hardship of inequality evidenced by gross disproportion between the tax computed without the benefit of Sec. 327 and 328 and the tax computed by reference to representative concerns specified in Sec. 328, but inequality alone is not sufficient to grant relief under Sec. 328, the inequality must be due to abnormal conditions affecting capital or income.

A gross disproportion and exceptional hardship may exist where a concern's profits tax liability on a net income of \$100,000 is \$40,000 and where the average tax paid by representative concerns on \$100,000 incomes is \$35,000. The terms "gross disproportion" and "exceptional hardship" do not mean that in order to obtain relief a corporation's tax liability must be double the average tax of representative concerns.

(3) The exceptional hardship caused by an excessive profits tax must be due to the existence of "abnormal conditions" affecting the net income or capital of a corporation. The amount of relief obtained under the special relief provisions depends largely on discovering the abnormal conditions peculiar to each case and citing decisions of the Income Tax Unit in support thereof.

The phrase "abnormal conditions affecting the capital or income of a corporation" has been defined by the

Wherever a company has borrowed much money or rents plant and equipment its taxes under the revenue acts will be excessive, except as modified by the special relief provisions which enable it to pay taxes proportional to those "of representative corporations engaged in a like or similar trade or business."

Income Tax Unit to include the following cases, among others:

(a) Where a corporation is placed in a position of inequality because of the time, or manner of organization. An illustration, of one of the numerous abnormal conditions coming within the scope of this definition, is as follows:

Company A was organized in 1905 and acquired coal lands containing 2,000,000 tons of coal at \$1 per ton. On Jan. 1, 1918, there remained 1,000,000 tons of coal and A's invested capital was \$1,000,000.

Companies B, C and D acquire similar coal lands on Dec. 31, 1917, containing an average of 1,000,000 tons of coal at \$2 per ton. The average invested capital of B, C and D is \$2,000,000.

A, B, C and D each mine 100,000 tons of coal and each makes a profit of \$100,000. A's tax would be excessive compared with B, C and D for the reason that A would only be allowed \$1,000,000 invested capital, and B, C and D an average invested capital of \$2,000,000 on similar net incomes.

Company A would be entitled to relief for the reason that it is placed in a position of inequality because of the *time* of organization. In this example A would also have an abnormal condition affecting net income for the reason that B, C and D would be allowed a depletion rate based on Dec. 31, 1917, values, whereas A, at best, could obtain only a depletion rate based on March 1, 1913, values. No recognition is given to the fact that under the statutory provisions of the law, A had capital unproductively invested in the 1,000,000 tons of coal since 1905. The only way these inequalities can be removed is under the special relief provisions.

(b) Where the capital employed, although a material income-producing factor, is small, or a large part borrowed. One of the many examples of this abnormal condition in the coal mining industry is as follows:

A operating a mine valued at \$1,000,000, composed of coal reserves valued at \$800,000 and a plant valued at \$200,000. A rents the plant and pays a nominal rental. The coal reserves were acquired by the payment of \$100,000 cash and a mortgage of \$700,000. A's statutory invested capital would be \$100,000 and he would be entitled to relief under the provisions of Sec. 327(d) for the reason that the capital employed, although a material income-producing factor, was in a large part borrowed. An exceptional hardship would be imposed because similar representative concerns that had no borrowed money would be allowed \$800,000 for statutory capital purposes. The rental payment in this case is analogous to an interest payment and the renting of plant or equipment results in the same abnormal condition as the use of borrowed money.

(c) Where intangible assets of recognized value and substantial in amount, built up or developed by the taxpayer are excluded from the invested capital computed under Sec. 326. This definition would include patents, trade names, good will, etc., developed by the taxpayer.

(d) Where the net income for the year is abnor-

mally high, due to the realization in one year of income earned during a period of years.

This condition may arise where the taxable net income of a corporation is the fruit of activities antedating the taxable year, or where the taxable net income is to some extent the result of capital unproductively invested in prior years. This abnormality, to a large extent, is the cause of many coal-mining companies paying an excessive tax for the reason that "carrying charges" are charged directly to operations. This also is one of the reasons why the coal-mining industry as a whole pays about the highest profits-tax rates of the numerous industries in the United States under the Federal Profits Tax Laws.

"Carrying charges" are capital expenditures made in prior years that benefit future years. Such charges accrue where assets, such as coal reserves, are carried upon which no profit will be realized until some future date. A few "carrying charges" in the coal-mining industry may be mentioned to illustrate the principles that distinguish them:

(1) Interest on money borrowed to carry coal reserves upon which no profit will be realized until some future date;

(2) An estimated interest charge on the "owned capital," i.e., capital stock and surplus that is invested in assets upon which no profit will be realized until some future date;

(3) Development expenses.

Where a mineral deposit has a life of twenty years, nineteen-twentieths of the first year's "carrying charges" should be capitalized and amortized on a unit basis to the unmined reserves. As the federal tax laws do not take cognizance of this fact under the statutory provisions of the law, the only source of relief is under the special relief provisions, the abnormal condition in this case being caused by the taxable net income being the result of capital unproductively employed in prior years and the fruits of activities antedating the taxable year. A concrete example of "carrying charges" is as follows:

A buys with borrowed money a coal deposit containing 200,000 tons of coal for \$100,000. The interest charge is 8 per cent per annum on the borrowed money. The deposit has a life of two years, 100,000 tons being sold the first year for \$200,000 and 100,000 tons in the second year for \$200,000. Assume for the sake of simplicity that the interest charges are the only expenditures.

At the end of the first year A liquidates all the borrowed money, and charges to the first year's profits the entire 8 per cent interest payment. The following erroneous yearly statement of profits results:

	First Year	Second Year
Income.....	\$200,000	\$200,000
Depletion.....	50,000	50,000
Total.....	\$150,000	\$150,000
Interest.....	8,000	None
Net Income.....	\$142,000	\$150,000

It can be seen from an analysis of this illustration that the first year's income is understated and the second year's overstated, for the reason that the \$8,000 interest charge is a "carrying charge" to the extent

If a coal-mining company or coal brokerage firm believes that its federal profit taxes have been overpaid and are excessive, application should be made for consideration under the special relief provisions. Great care should be taken that the reasons why special relief is necessary are cited in detail together with the facts upon which such reasons are based. Where the tax has been assessed and paid a claim for refund should be filed as soon as possible to prevent the tolling of the statute of limitations.

of \$4,000 which should have been capitalized in the first year and charged as an expense in the second year. Where a corporation's taxable year is analogous to the second year in the above example the net income may be said to be the result of capital unproductively invested in prior years. A corporation that has mined in a taxable year coal that has been carried for a period of years is placed at a serious disadvantage with a concern that mines from a coal deposit with a comparatively short life.

(e) Where a corporation's war-profits credit due to an abnormal pre-war period is less than the war profits credit allowed representative concerns with normal pre-war periods.

(f) Where a corporation has paid no salaries to its officers or has paid them salaries which were unusually low in comparison with the salaries paid to officers of representative concerns. It must be proven, however, that the officers for whom it is claimed were entitled to

a salary for actually rendered services and were not merely "figureheads."

(g) Where a corporation's net income is abnormally high due to the realization of profits on the sale of capital assets. An example of this abnormality is where a corporation liquidates all or part of its business.

(h) Where proper recognition or allowance cannot be made for amortization, obsolescence or exceptional depletion due to the World War. In connection with amortization allowances the Income Tax Unit has recently held in A.R.R. 3920, Bulletin 11-29-1146 that, "Coal used in the manufacture of war materials is an article which contributed to the war."

It would therefore follow that coal-mining companies were entitled to amortization of war facilities, and that where proper recognition or allowance cannot be made for amortization, obsolescence or exceptional depletion, consideration should be granted under the special relief provisions.

Pennsylvania Coals Suited to Baking, but Need Is Not Obvious

STUDIES of low-temperature carbonization of the Pittsburgh and Upper Kittanning coals, made at the Pittsburgh Experiment Station, by the U. S. Bureau of Mines in co-operation with the Carnegie Institute of Technology indicate that the Pittsburgh bed of coal is in general well suited to that process. When carbonized at 550 deg. C. in a stationary vertical retort it will yield per ton 33 to 35 gallons of tar, 3,500 cu.ft. of 600-B.t.u. gas, 1,400 lb. of coke having 10-per cent of volatile matter, and 6 to 8 lb. of ammonium sulphate.

The other parts of the Pittsburgh bed—namely, the rooster, the lower roof and the upper roof are of similar coking quality, differing only in the quantity of by-products yielded. These decrease in the order given. The yield of tar from the upper roof is only 66 per cent of that from the regular seam, and from the rooster coal 75 per cent. The difference is largely due to the variation in the ash content of the different sections, and not to the chemical composition of the coals.

TAR YIELD OF SEMI-BITUMINOUS COAL LOW

The Upper Kittanning coal tested was not a good low-temperature coking coal. The coke was not dense, and the yield of by products was low. The particular coal coked was a semi-bituminous coal with low volatile matter and was not expected to yield much tar.

The total quantity of crude light oil suitable for motor fuel that was obtained directly from Pittsburgh or Freeport coal by distillation at 550 deg. C., and by cracking is approximately 7.1 gallons per ton, or 2.6 per cent by weight of the coal. The net refined motor fuel from the process is 4.6 gallons per ton, or 1.7 per cent by weight of the coal.

Superheated steam has an effect upon the byproducts of low-temperature carbonization. The tars obtained by its use were more viscous and contained a smaller quantity of light oils and a larger quantity of heavy oils. The quantity of byproducts obtained by carbonizing with superheated steam was practically the same as without steam. To some extent the steam prevented secondary decomposition.

Research on the low-temperature carbonization of coal has been in progress for a number of years, the main object being to produce a coke more suitable for

domestic use than the high-temperature product of the gas works and coke ovens, and at the same time to effect a higher recovery of constituents in the tar oils, according to J. D. Davis, fuels chemist, Bureau of Mines, and V. Frank Parry, research fellow, Carnegie Institute of Technology, in Bulletin 8, Coal Mining Investigations, just published by the Carnegie Institute of Technology, Pittsburgh, Pa.

Much valuable data has been accumulated, but this in the United States has not as yet led to any industrial development worth mentioning. Since the World War, investigators have been particularly active in England, where one of the main incentives is the production of fuel oil which that country would like to obtain from a domestic source. Presumably, there is also a good demand for low-temperature coke for open fires in English homes.

DEMAND SMALL FOR LOW-TEMPERATURE PRODUCTS

In Germany, during the war, research on low-temperature tar oils was carried on intensively on account of the demand for lubricants which would substitute for mineral oils. Such lubricants can be made from refined tars, and quantities of lubricants were made from that source during that period, but it is doubtful whether they are competing now with imported petroleum oils. Obviously, a definite demand must exist for low-temperature products before any extensive development of the method can be expected. The abundant supply of petroleum in the United States and a like supply of coal suitable for high-temperature coking would seem at least for a time to preclude competition of low temperature products in either field.

There is, however, a strong possibility of better utilization of waste coals and coals of inferior rank by low-temperature methods, and this phase of the subject should be a fruitful field for research. Further, the utilization of low-temperature tar oils for special purposes, as for example, for the preservation of timber, is a reasonable expectation; as is also the improvement of high-temperature coke by preliminary low-temperature treatment. These points have yet to be proved industrially practicable.

Bulletin 8, "The Low-Temperature Carbonization of Pennsylvania Coals—the Pittsburgh and Upper Kittanning Beds," may be obtained from the Carnegie Institute of Technology, Pittsburgh, Pa., at a price of 40c.

Institute of Mining and Metallurgical Engineers Take Stock of Progress

Year Has Seen Great Development in Conveyor Mining, Flotation of Coal in Quicksand and Dry Cleaning of Coal—New Light on Rock Dusting—Foreign Lights Illuminate Domestic Problems.

With only a few coal-mining company officials present to discuss the able papers presented and read, the American Institute of Mining and Metallurgical Engineers held at the Engineers' Societies Building, New York City many eventful sessions during its 129th meeting, Feb. 18-21. Several sections were continually in progress and plenty of entertainment was provided to fill the evenings, recesses and the final day.

The first evening was enlivened by a smoker with radio and slide hits at the institute's officers. Only with difficulty could the crowd be accommodated. The radio proved its ability to give vent to mysterious raucous sounds, finally announcing that President Mathewson was needed in the cloak room as his stored apparel was leaking. A clever trickster discovered a hare down Secretary Sharpless' back, and explained the art of jugglery most satisfactorily, only to mystify the crowd by performing the feat in an entirely different and inexplicable way. A film explaining radio and one portraying a fierce and combative mouse were other features. Harlowe Hardinge exhibited the music obtainable by bending a common hand-saw and stroking its edge with a fiddle bow. If you think this an easy trick, just try it before you make up your mind.

MEMBERS IN CANADIAN MOVIES

On the evening of Tuesday, motion pictures taken by the Ontario government of the trip of the institute through Toronto and the mining regions of that province were presented, several of the members recognizing themselves and their friends on the shining sheet. The films have been presented to the institute by the Ontario government. Lantern slides and motion pictures exhibited also an eventful fishing trip in Canada and two men undertaking, at different times, to ride on a moose as that animal swam in one of the lakes of the North Country. Neither ride was long, nor was the ending of it graceful, but the narrator's story and the pursuit in a canoe as portrayed on the screen was worth traveling a long way to hear and see. A snow-packing roller with wheels built like big screws showed how it is proposed to "mush" in northern latitudes where the removal of the snow is not possible. A buffet lunch and a dance concluded the evening's entertainment.

Wednesday evening ushered in the annual dinner in the Waldorf-Astoria with J. V. W. Reynders as toastmaster and E. P. Mathewson, the retiring president; William Kelly, the new president and Dr. R. V. Wheeler, Director

of the British Safety-in-Mines Station, as speakers. The James Douglas medal was presented to C. W. Merrill as recognition of his work in cyanidation and other forms of metallurgical practice.

On Tuesday morning the annual business session was held in the auditorium. The report of the secretary showed a shrinkage in membership of 285, reducing the roll from 9,413 to 9,128. The gross loss of membership was 960, of which 173 was a loss by resignation, 78 by death and 709 by suspension. Many foreign members resigned owing to the burden of meeting the dues resulting from the decline in the value of currency in the countries in which they lived. Of the 9,128 members, 18 are honorary, 6,956 full members, 839 associates and 1,315 junior associates. Three past presidents died during the year 1923—Robert W. Hunt, Horace V. Winchell, and Albert R. Ledoux; Edwin M. Ludlow dying in the present year.

The treasurer reported gross receipts of \$208,433.04 and gross expenditures of \$198,036.14 and a valuation of assets of \$725,062.89 of which \$141,031.37 was in various funds, \$41,993.01 in cash and \$5,940.02 in paper on hand.

WILLIAM KELLY NAMED PRESIDENT

The tellers announced through the secretary that William Kelly, of Vulcan, Mich., was elected president; E. L. De Golyer, of New York City, and C. W. Merrill, of San Francisco, vice-presidents and directors. The directors elected were R. V. Norris, Wilkes-Barre, Pa.; G. O. Smith, Washington, D. C.; P. B. Butler, Joplin, Mo.; B. D. Quarrie, Cleveland, Ohio, and L. D. Ricketts of Warren, Ariz. Both the amendments to the constitution received almost unanimous adoption, that to Art. II, Sec. 2, receiving 1,719 favorable to 194 unfavorable votes and that to Art. III, Sec. 3, receiving 1,484 ayes to 424 noes. About 50 unmarked ballots were thrown out in each vote. About a third of the membership voted on the Mellon taxation plan, 98 per cent being in favor of its adoption.

H. A. Wheeler advocated a reduction in the number of directors, the replacement of short monthly board meetings by quarterly sessions of longer duration and the payment of directors' traveling expenses, but several directors mostly from New York spoke against the change. R. A. Parker, of Denver, Col., wanted the board to be elected locally and not at large even though the country is districted and directors have to be chosen in certain numbers from each district.

A large number of members attended the excursion on the last day to the Bethlehem Steel Works. They were

shown the 424 Kopper ovens, each of a capacity of 13½ tons consuming 7,000 tons of coal daily and producing 5,000 tons of coke, 45,000,000 cu.ft. of gas, 175,000 lb. of ammonium sulphate, 50,000 gallons of tar and 18,000 gallons of light oils. Five kinds of coal are used in these ovens after mixing. They visited also the blast furnaces of which there are seven at the Lehigh plant, the mixing plant and two 200-ton basic tilting furnaces. The visitors also saw the rolling mills and were entertained by the Steel Works at a buffet lunch.

European Methods Contrasted With American

George S. Rice, in the principal address of the first session of the joint committees on Coal & Coke, Ground Movement & Subsidence, compared the method and conditions of the European collieries with those of America, using many lantern slides to illustrate his remarks. His first picture showing the Wemyss (pronounced Weems) Colliery showed how close some of the mines were to tidewater; so close in fact, as to make a railroad almost unnecessary. Mr. Rice said that in Great Britain and in Europe generally the coal did not seem to have the bone which makes the washing of coal such a difficult undertaking in the United States. Washers that give good results in Great Britain might not serve as well here.

In Great Britain the dump must be at least 80 yd. from the head of the shaft, Mr. Rice said. In France, Belgium and Germany as also in Great Britain steel arching was preferred to concrete wherever the pressure of the roof was extreme. It had the advantage of flexibility. In the latter country, at least, corrugated iron had been used for lagging, this on the suggestion of the Henry Louis.

DUSTING NOT COMPULSORY, BUT USED

A slide showed a chalk stripping in France where chalk was being mined for grinding into dust for use in immunizing the mines from explosions. The chalk contains many flints. These are not crushed but separated from the chalk and used for road material. Rock dusting is not compulsory in France but is quite generally used, nevertheless.

Mr. Rice also showed some oil mines in Alsace. In earlier days mines had been opened in the oil shales but the accidents had been so frequent that they were abandoned. Later the shales were drilled and a part of the oil abstracted in that manner. When the oil thus obtainable had been extracted

mines again were opened. The drilling had reduced the gas pressure and with good ventilation, it was possible to work them safely. The roof and shale were extremely rotten and in some mines it was necessary to board up the working face except where the shale was being removed. In others, forepoling only was required, but the work was quite difficult and expensive.

Narrow passageways were driven through the shale and the oil seeped out and ran in channels underneath the track to the shaft where it was pumped to the surface. The risk of explosion was naturally greater than in coal mines and the use of picks was forbidden for it was feared that they might spark and ignite the gas. The rock worked hard on the face but broke easily when released from the mass. Every precaution had to be taken for the gas had a much lower explosive limit than methane. The Germans opened the mines but the French were now continuing their operation. Mr. Rice said that it was the intention to remove all the shale so as to give an opportunity to recover all the oil.

The speaker also showed several of the destroyed and renovated mines and explained how the shafts were repaired by cementation, diving bells with peep holes in certain instances being lowered into the water from which to observe the condition of the walls of the shaft. He also showed some liquid-oxygen blasts in quarries, explaining that these explosives had been used in coal mines by the Germans.

It is believed that they had many explosions from this cause, but as they occurred during the war, no word of them reached the public. He said that they should not be used in underground coal mines as they gave out much flame. He added that sometimes powdered coal was used with the liquid oxygen as the material the oxygenation of which produced the blast.

At the opening of the meeting, H. Eustace Mitton, member of the Council of the (British) Institution of Mining Engineers was introduced by the chairman, Howard N. Eavenson, and made some remarks. Dr. R. V. Wheeler, Director British Safety-in Mines Station at Eskmeals, Cumberland, England, detained by an investigation of a recent disaster, was unable to be present.

Subcommittees on Industrial Relations Report

During the year 1923, according to B. F. Tillson, assistant superintendent, New Jersey Zinc Co., and chairman of the Safety Subcommittee of the Industrial Relations Section in a report made to that committee, the number of chapters of the Joseph A. Holmes Safety Association grew from 35 to 81 and probably is now between 85 and 90. These chapters are distributed through the mining camps of some fifteen states in this country.

Although during the past year the coal industry has had nine serious disasters, which caused the death of 287 men, yet many advances have been made in coal-mine safety practices and installations, based at least to a certain extent on suggestions and experi-

ences in connection with the serious coal-mine disasters which occurred during the latter part of 1922 and the early part of 1923.

The principal causes of these major mine disasters were: The use of open lights, the use of black blasting powder, and the sparking of electrical apparatus. Open lights in three major disasters resulted in the loss of 109 lives and in three minor disasters caused the death of three and the injury of 21 other men. Black powder caused in two major and three minor disasters the death of 24 men. Sparking electrical apparatus caused two major disasters and the death of 147 men.

Use of rock dust for restriction or prevention of explosions has been taken up in earnest, especially in the western states; at one mining camp alone over six miles of underground haulageway has been rock-dusted and nearly 2,000 V-troughs for rock-dust barriers have been placed at strategic points underground.

EXPLOSIVES REDUCED 25 PER CENT

Permissible explosives have been substituted in a number of mines for black powder; mines which had been blasting with miners on shift are now restricting blasting until the end of that working period; other mines which were blasting after the main shift, but had permitted the holes to be loaded by miners while on shift, have adopted the practice of not allowing any explosive in the mine during the regular working hours, the holes being both loaded and fired after the shift. Some coal mines have adopted a system of air spacing in blasting holes with intent to increase the percentage of lump coal and decrease the quantity of slack and of dangerous fine dust sent into the air. The result has been very satisfactory as the objects outlined have been accomplished and at the same time the quantity of explosive has been reduced 25 or more per cent.

Some coal mines are experimenting with the use of storage batteries, not only for gathering purposes, but also for main haulage and for undercutting machines, the intent being to remove electric power wires from the mines, or at any rate, from the vicinity of the working places.

Sprinkling systems for the wetting of mines have been greatly extended. In 1923 one company laid nearly 35 miles of water lines underground for sprinkling purposes. Every working place in these mines has its water line and is provided with about 20 ft. of rubber hose, the man working at the face being required to wet the coal before shoveling it into the car and also to sprinkle the top of the car when loaded.

The practice of using a water spray on the cutting chain of shortwall undercutting machines in coal mines has spread rapidly and not only makes the air of the place practically dustless while undercutting, but also makes the dreaded "bug dust" harmless. In fact the wet "bug dust" helps to kill the dust from subsequent blasting and shoveling.

A new permissible electric cap lamp has been placed on the market and its lighting capacity is said to be equal to that of the ordinary carbide light. It

has the advantage over the carbide lamp that without attention it furnishes light throughout the entire shift. This lamp may replace open lights in both coal and metal mines as it will not cause fires or explosions and it gives better light than other safety lamps, and at least as good as ordinary open flame lamps, and does not require attention during the shift.

A number of coal mines have removed from use all flame safety lamps except those magnetically locked and equipped with automatic or friction igniter.

For use as auxiliary power for main fan operation in case of failure of the primary power, gas or kerosene engines are being placed in such manner that the auxiliary power may be applied to this fan within a very few minutes after interruption of primary power. One coal company has created a new position not only giving the experienced mining man, who has been appointed, charge of safety work but also full operating authority. Hence he has power to enforce immediately such action as he sees fit to recommend as needed to assure safety.

Among the numerous activities of the U. S. Bureau of Mines as to health and safety in mines the following may be mentioned:

Ventilation and dust studies were continued in metal mines and extended into coal mines and much interesting data collected as to the effect of various kinds of dusts (silicious, non-silicious, coal dust, or a mixture of coal and rock dust) upon health. Also, a study was made as to the effect upon underground workers of practically continuous breathing of small quantities of carbon monoxide.

NEW DUST SAMPLER INVENTED

A new method was developed for the sampling of dust from air with special applicability to mine air in coal or metal mines. The instrument is called the Impinger and its principle is the forcing of the air samples through a fluid, thus filtering the dust out of the air and leaving it in the fluid where it is available for later analytical work.

An extended study was made, in underground openings, of frictional coefficients in connection with air flow under various conditions. The U. S. Bureau of Mines also instituted during the year what is known as Safety Service work under which bureau engineers, after making mine inspections, furnish confidential written reports to the operator embodying the conclusions of the engineer as to the condition relative to safety with recommendations as to betterments.

Arthur Notman, consulting engineer, of New York City, reported for the subcommittee on Employment and Industrial Organization, setting in action a lively discussion on immigration and of the proposed law for the further restricting of the entry of aliens. B. F. Tillson declared that the industries of the United States, judging from past records of immigration, were at least 1,500,000 men short of these requirements and added that the law, by admitting more Northern Europeans, was not providing for any relief; for none of these men would perform common labor. He saw no hope except in the

raising of wages to such a level that the man who labored with his hands would be better paid than the man who was engaged at brain labor. Some questioned whether the Southern Europeans were inferior in any way to the Northern and said they were more desirable because inured to labor. Those Europeans who had neither Asiatic nor African admixture in their blood were capable of becoming citizens of great value to the country though they might be below our educational standards.

E. A. Holbrook, Dean of Mining, Pennsylvania State College, made a report on education for the subcommittee, of which he was chairman. This report, made partly to "sell" the advantages of safety to the American Institute of Mining and Metallurgical Engineers, was a masterly study of the economics of mine accidents and is well qualified to "sell" the safety idea to those who do not yet realize its importance as an engineering study in mine operation. It will be published later in *Coal Age*.

SAVINGS IN COMPENSATION

In brief, it showed that if rates for compensation as high as 2.1 per cent of the total cost of operation were reduced to 0.91 per cent the difference in cost between the extremes at a mine employing 500 men would be about \$17,000 per year. He added that the average time lost owing to temporary compensable accidents in Pennsylvania alone was equivalent to 899,958 man-days. "This means," he said, "that 3,600 men are supported constantly who are doing no work."

Dr. R. R. Sayers, chief surgeon, U. S. Bureau of Mines, was not present but sent a paper entitled "Observations on Health Conditions in Mines of Foreign Countries. Most of his references were to diseases and conditions found in metal mines. He said, however: "In view of the health hazard due to breathing silicious dust, the question of safe rock dust is much discussed in Great Britain.

"Mortality statistics of workers have been carefully studied. On the basis of these studies, certain dusts have been found to be relatively harmless, at least no more harmful than coal dust, all investigators being agreed that limestone dust is the safest, especially if it contains a percentage of magnesium. Shale dusts of varying composition are used in some coal mines for dusting purposes without apparent harm to the men exposed.

"Animals have been subjected to various types of dust and the effects noted. Dr. A. Mavrogordato, of South Africa, believes that it is possible to determine the relative safety of breathing a given dust within three months by animal experimentation. Dr. W. E. Guy, of London, thinks that the time required would be at least one year. However, they use different methods and the time for reaction might vary accordingly."

As to fatigue, Dr. Sayers said: "Dr. C. S. Myers, of the National Institute of Industrial Psychology, states that he has been able to decrease the fatigue and increase the efficiency of coal miners by training the men to use the pick properly. Dr. Myers advises a

slower stroke in picking coal but a faster stroke in picking down hard stone." Sidney Rolfe, U. S. Metals Refining Co., Carteret, N. J., presided at the meeting.

Ways of Lowering Mine Costs And of Bettering Coal

Mining by the "V" system was described by Glenn B. Southward, chief engineer, West Virginia Coal & Coke Co., at the Coal meeting held under the chairmanship of Howard N. Eavenson, consulting engineer, Pittsburgh, Pa. *Coal Age* has so completely described this method in an article which appeared Feb. 7 on pages 197-203 that much further elaboration is not needed. Mr. Southward said:

"The design was perfected in the summer of 1921 by myself, and a trial face was started in December of that year. This was intended mainly as a test on the mechanical equipment and a preliminary experiment on roof action. During these experiments, development was started for the "V" system but because of the six months' interruption by a strike, mining on the "V" faces was not begun until late in 1922. The trials on the "V" system continued through an experimental period of several months and by March, 1923, we were convinced that an operating system had been devised. Since that time no changes have been made except in details. These were introduced to increase efficiency and reduce cost.

STRAIGHT FACES WERE FAILURE

"During the experimental period straight faces were tried but they failed. The first trials on the "V" system were with faces 100 ft. long and a central angle of 90 deg. This made a span of 160 ft. from point to point. With these dimensions the beam effect was not obtained; the span was too great and the roof action was practically the same as when straight faces were used. It was some time before this fact was fully accepted, because it was always possible that the failures on the 90-deg. angle were caused by ineffective timbering or improper methods. Several procedures were thoroughly tried; these involved different sizes and spacing of posts, cribs and packwalls, also different timing of roof falls. Falls over large areas and over small were duly tried, but the results were practically the same in every case—the top fell inside the points and along the faces."

Speaking about falls which trespass on the working faces Mr. Southward said, "The falls do not generally come to any extent within the points, except where the top is weak. As such times, the face conveyors are shortened to a point of safety and mining is not interrupted. The output is decreased for only one or two days, for the faces are lengthened on each succeeding cut after the fall and soon regain their full length." He added that the first panel was close to the outcrop and that the outside faces were therefore under light cover. In consequence the roof would not span the normal width, and it was thought best to shorten this length of span by shortening the faces. This left

a narrow pillar unmined but no more coal was lost than would have been left in had the room-and-pillar method been used under similar conditions. Mr. Southward continued:

"The plan described is a combination of conveyors and mine cars, but it is doubtful if this is the most efficient or the most desirable arrangement. A plan is now under consideration, and experimental work on it is being started, to extend the conveyor system all the way to the tippie, thus eliminating all mine-car haulage. Because of the increased output per employee and the consequent reduction in the houses required, also by the elimination of all track, haulage and gathering locomotives and reducing the number of mining machines and pumps, it has been estimated that the cost of installing an all-conveyor mine should be from 25 to 40 per cent less than that required for a room-and-pillar mine of the same output. This, however, is mainly theoretical at this time."

EIGHT UNITS WORK INDEPENDENTLY

Speaking of the flexibility of the system Mr. Southward said, "With 600 ft. of working face in an area 300 ft. wide, there are eight separate operating units and an interruption on any one of these faces does not affect the operation of the others; whereas with a long single face a fall or other interruption may stop the entire output until the trouble is removed. In case a fall should occur within any angle so as to close a face completely, it would not be necessary to reopen this as the coal in the point could be recovered by lengthening the adjoining face on the next cross-entry."

In answer to questions, Mr. Southward said that on each face four or five daymen were employed. He declared there was too much waste thrown among the timbers to make their recovery economical. As to the possibility of caves should the mine operation be irregular, he said that about July 4, 1923, the mine was idle for 10 days and when work was resumed no change was observable. However, a fall had occurred just before that suspension relieving the pillars from a considerable part of the weight. A fall is made every 60 ft. He could not say what would happen if a fall were left hanging when work was suspended. It would not be good engineering to permit this to happen. The mine runs on a two-shift basis, the coal being loaded in the day and being cut and shot at night.

PREFER MECHANICAL PRECIPITATION

Ray W. Arms then read a paper on the "Dry Cleaning of Coal" for which no space is available for reprinting at this time. The paper is well worthy of publication and will appear in an early issue of *Coal Age*. Mr. Arms frankly admitted that difficulties had been experienced at McComas, W. Va., in the sizing of the coal and in the collection of dust similar to those detailed by Frank Young in a paper describing the brilliant plant at Raton, N. M., published in *Coal Age*, May 17, 1923, pp. 791-797. These difficulties have been overcome. The air-cleaning machines at McComas and Wyco, W. Va., have a

larger capacity than those at Raton. The reduction of ash in coals of various regions has varied from 46 to 64 per cent. No. 2 buckwheat from the Pennsylvania anthracite field having exhibited the larger reduction. The ash which was 18.7 in the crude coal becoming 8.5 per cent after treatment. Mr. Arms said that Mr. Nesbitt, of Pittsburgh Pa., had favored electrical precipitation of the finest dusts but after investigation had decided that mechanical precipitation by baffles was preferable.

E. M. Chance described the Chance system of cleaning coal by floating it in a quicksand maintained at a given density. He advocated the crushing of the rejects from one flotation tank and their washing in another so as to prevent clean coal being lost by being dragged down by bone or slate. The coal could be crushed in its entirety but that would prevent the production of any coarse coal and add unduly to the sizes under $\frac{1}{8}$ in. that cause the formation of slimes which it is hard to separate from their interstitial moisture.

Accident Reduction Sought in Forum with Safety Council

Three notable addresses on safety in mining occupied the joint session of the Industrial Relations Committee with the Mining Section of the National Safety Council, Feb. 19. R. Dawson Hall was chairman. Among these papers, that by W. W. Adams on "Mine Accident Statistics" was perhaps the most important. Mr. Adams has combined the reports made by members of the National Safety Council in a series of tabulations giving far more detailed information, perhaps, than previously has been available. Certainly, it has this transcendent importance that it stretches across state lines and so combines the experience of many fields.

This paper will be published in *Coal Age*. It shows, what may not be universally true, that the haulage hazard is greater in the rooms than on the haulage roads. As the chairman declared, the figures lead to the conclusion that the gathering hazard is greater than the main-haulage risk. It seems possible that there will hereafter be less gathering by mules and locomotives. When coal is brought by conveyors to the main roadways this hazard will be eliminated, and as it shows itself to be extremely important its eradication will be a great gain for safety.

When B. F. Tillson at the autumn meeting of the National Safety Council suggested that the cars might be kept in the main roadways, thus making a car with a larger wheel base feasible in accord with A. J. Hoskins' suggestion, he probably did not realize how close the development of the conveyor brought that improvement. A few short months have convinced the industry that conveyors are well justified and a notable reduction in the gathering hazard may result. Cars, as the chairman said, may not have to be uncoupled either in the mine or indeed outside of it provided the rotary-dump or the bottom-dump car is introduced. Fur-

thermore, larger cars on straighter tracks may have a larger wheel base and may be equipped with better brakes. Is it too much to hope that they may be actuated by air, which will come into action at the will of the motorman, or if a car or cars become uncoupled? Better haulage conditions may result; more than counteracting the increase of hazard from that source which recent years has shown. In fact, here again, better engineering and greater economy will mean increased safety.

Speaking of the gas and dust explosion hazard, John T. Ryan said that in the northern field of France not a single man had even been burned by a gas explosion since 1917, showing an almost unbelievable progress in the avoidance of the explosion hazard. Dean Hollbrook asked Mr. Greensfelder if fuses could be so arranged that they could not be cut off at improper lengths. Mr. Greensfelder believed that this would be difficult. Furthermore, he said that it would have to be taken up with the fuse companies, fuse not being manufactured by powder firms. It was suggested that the coal companies sell the fuse in suitable lengths for blasting. The chairman thought that this might make matters worse, compelling the man who wanted to use a "skin-em-back" to use a half length which might be shorter and more risky than the length he would otherwise use. R. N. Hosler suggested that the use of fuse be abandoned entirely, and J. J. Walsh declared that electric batteries soon might be required by law in Pennsylvania mines, the increased safety more than compensating for the cost.

MAGNETIC ROPE TEST COMPLICATED

R. L. Sanford read a paper on "Magnetic Investigations of Hoisting Rope," saying that the purpose was to test the rope by some simple magnetic method as it traveled up the shaft. Unfortunately, the rope was under strain in the act of hoisting and that strain varied with the position of the rope in the shaft and with the acceleration or retardation of the cage. As the magnetic qualities varied with the strain and changed sign during an increase in load, and as parts of the rope might be in strain as laid in the rope and released from strain when the rope was stretched, the subject was quite complicated and not to be settled without careful investigation, which he was making in the hope that some way out of the difficulty might be found.

He said in answer of W. R. Chedsey that electrical resistance was a poor way of determining the condition of the rope, for it varied with the contact between the wires in the strand and the lubrication. The current had to cross between the strands and a well-lubricated rope might behave like one that was severely rusted. Mr. Chedsey asked Mr. Sanford's opinion as to the use of high-frequency currents in rope testing, and the latter replied that with such frequencies there was what is known as a "skin effect," the current tending to follow the outside of the rope which was just the reverse of what was desired. We can form visually some idea of the condition of the exterior of

the rope, but of the interior we know nothing till we cut and destroy it.

H. Foster Bain's paper on "The Bureau of Mines' Work for Safety," read in his absence by T. T. Read, brought out the fact that our keen desire for industrial accident-prevention work was consequent on the amelioration of the other hazards of life. This had brought out in bright light the dangers of industry. When sixty million men died from smallpox in Europe in the limits of a single century (the Eighteenth), when murder was so common that men shook hands with the idea of disarming an appearing friend but possible enemy, no one but the victim cared much about a chance accident or death that might happen as a result of the careless actions of some fellow worker or employer. "Industrial hazards," said he, "now come out in relief just as the candle shines when electric lights are turned off."

ACCIDENT RELIEF CONSIDERED

Mr. Bain said that the desire was universal to "do something" about mine accidents. The work of the Bureau was to ascertain what that "something" should be. He said, "Under our system of dual government, regulatory powers in the mines rest with the states but, where prior to formulating regulations, extensive and expensive research in technical matters is required, there is obvious economy in the states acting through the Federal government, and thus avoiding duplication and disagreement. The Bureau spent approximately a quarter of a million dollars in its five years' work at the experimental mine on dust barriers. Obviously it would be poor economy to have each of the 29 coal-mining states duplicate this work, and though the amount spent may seem large it is to be remembered that the property damage alone in one coal-mine explosion is often larger."

T. T. Read then read his paper on "Mental Hygiene in Industry." He remarked in his summary "that the engineer will not have attained the full measure of a man until to the fairly complete mastery he has attained over mechanical forces he had added a corresponding degree of mastery over the other, less measurable but no less potent forces that act on human beings who are the most important factors in industry."

In the round table which followed, Mr. Pallister declared that inquiry should be made into the possibility of radio causing the premature explosion of blasts, such explosions having been caused a quarter of a mile from a high-power radio station.

What Australasia May Teach

Fresh from a sojourn in Australasia, Dr. A. J. Lanza, at the final session of the Industrial Relations Committee, gave an interesting account of labor conditions in Australia and New Zealand where the workers intent on governmental operation of all industry deliberately seek to make operating conditions unbearable with the idea of forcing government ownership.

Strikes are deliberately arranged, not for the correction of grievances actual

or imagined, but solely for their effect on the morale of the management; here today, there tomorrow and at a third mine the next day. The antagonism between labor and capital has reached a chronic stage.

Doctor Lanza said that only two plants had attempted industrial relations work, but it had been successful where introduced. He emphasized the importance of studying the historical background of these disagreements and believed that the conditions in Australia were the outcome of long inherited antagonisms. It is not to be supposed that the larger mines lacked change houses or favorable working conditions. The metal mines certainly took good care of their men, taking temperature readings and dust counts and providing excellent circulation of air. That could not be said of the coal mines, which, strange to say, in Australia lagged behind the metal mines, doubtless because the former were smaller operations and because the metal mines had found it necessary to combat the dangers of silicious dust.

Speaking about nystagmus, Doctor Lanza said there was none of it in metal mines but the coal mines had it. J. W. Paul suggested it might come from using hand lamps and hanging them up. The glare from the suspended lamp in the darkness might cause the spasms of the eyeball, termed nystagmus, but Doctor Lanza said the lights were carried in many ways. In response to a question by R. D. Hall, he said he was not ill-disposed to believe that some germ might be the cause of nystagmus. The spasmodic movement of the eyeball from right to left and left to right was so marked, no one could suggest that the disease was one of imagination or malingering.

REPRESENTATION NOT NECESSARY

Robert E. Tally's paper was read by Arthur Notman, the chairman. Mr. Tally who is connected with the United Verde Copper Co., Jerome, Ariz., said his company had no employee's representation. "This plan," he said, "is very satisfactory for large organizations, and also for such small companies as have their work scattered over a large area. However, there are conditions under which such a plan is not necessary."

L. K. Silcox, of the Chicago, Milwaukee & St. Paul R.R., not being present, his paper was read by Sidney Rolle. He laid emphasis in this paper on the historic development of the labor unions through the merchant, craft and yeoman, or journeyman guilds. He declared that "many lessons and inferences might be drawn from the industrial evolution of England, not the least of which is the utter futility of legislative action as a means of augmenting a change, and that open rebellion or forceful reaction has but slight influence upon the general trend, for it is a recognized fact that great national crises have left but slight impress on society, while important changes have taken place slowly and by almost imperceptible development." That is to say, only the history of evolution, not the history of events, counts in the life of the race.

Opportunities for Mining Engineers Canvassed

What changes in the mechanical equipment of collieries will do to advance the interest of the mining engineer in coal mines was the subject of R. Dawson Hall's address at a joint meeting of the institute with the Mining & Metallurgical Society of America, held under the chairmanship of B. B. Gottsberger, of Yale University.

After detailing the revolutionary changes sure to arise from the introduction of the conveyor and the mechanical shovel, Mr. Hall said, "Clearly where such changes are taking place, there is room for men who have an ability to grasp new ideas and practices and to perfect them. The 'Cousin Jacks' of metal mining have their duplicates in the coal industry, and unfortunately the latter industry has never had the benefit of the extensive introduction of technical graduates which has marked and modified the development of metal mining. Most of the colleges are laying more stress on metal than on coal mining, though there is probably equal opportunity in both. It will be almost impossible to make a successful rebirth of the coal industry without a large incursion of technical men."

FOREIGN MINING NOT HOPEFUL

T. W. Finch spoke about the "New Fields for Mining Engineers in Foreign Countries," but was not particularly hopeful. In China, Americans are soon replaced by native technicians, who may not devise new methods, but can adopt those already in operation. In Russia and Siberia, Americans are welcome to operate the properties that local capital cannot handle or which local opinion regards as of dubious value. Coal is China's chief asset, but already many companies are in the field.

L. W. Mayer, a banker, discussed "The Engineer's Relation to Bankers." He said that the engineer had as yet neither properly evaluated his services nor was he duly valued by the investment world. When advertisements for bond issues were published, the lawyer's approval of their legality appeared but the engineer's name did not appear. The engineer in fact was usually not well enough known to carry due weight with the public.

He declared that the banker engaged the attorney without inquiring his charges; whereas when he looked for an engineer he shopped around and took care to see he got the lowest figure. The lawyer's fee he regarded as a charge he must prepare to meet, however high. The engineer's fee was something he could beat down to the lowest figure. In fact, the engineer entered the industry mainly because it appealed to his lust for adventure and travel and the lawyer because the profession promised lucrative reward.

The engineer's judgment was as good as the lawyer's or the banker's especially as to his part, the cost of the plant, but he usually failed to consider the overhead, the cost of legal advice and of getting the capital and the heavy charge for interest between the

time of acquiring the capital and arriving at the estimated production.

N. C. Rockwood urged in his paper the needs of the rock-products industry for engineers who would study its problems as carefully as engineers had studied those of coal and metal mining and metallurgy. Even the sand business needed geological, mechanical and marketing study.

Who's Who in Safety

What the foreman and the workman can do to vitalize and drive forward a safety movement was emphasized by two speakers at the final session of the Industrial Relations committee, Feb. 20. At this meeting, Sidney Rolle presided. The first paper, entitled the "Vital Factor in Industrial Relations," by G. M. Gillette, was read by Mr. Rolle. The author pointed out that in all industrial organizations the foreman was the direct point of contact between the management and the workers. He is the go-between, so to speak, and must represent the company to the employee and the employee to the company. If he is a man of vindictive character, this fact will sadly detract from his usefulness as a foreman. If, on the other hand, he is a man of kindly and sympathetic disposition, with the ability to lead and not drive, he may become a potent factor in averting industrial strife.

INDUSTRIAL PLAN SUCCESSFUL

In discussing this paper, W. R. Webster, of the Bridgeport Brass Co., stated that his firm adopted the industrial plan at the direct suggestion of the United States Government. It has, however, worked successfully. The company representatives in the deliberative body, established under the industrial plan, are almost invariably foremen. Matters of plant safety are placed entirely in the hands of a committee which is held strictly responsible for all accidents. This also has had a decidedly beneficial effect.

The plan has also done much to reduce radicalism and has served effectively in transferring the viewpoint of the company to the minds of the workmen. It is highly effective as a means of education. Why one man is paid more for his services than another is a mystery to most workers. When it is explained that the services which the higher priced man renders are more valuable than those of the man lower paid, much rabid radicalism disappears.

Mr. Lavine stated that behind the non-commissioned officer to which the foreman had been likened was inflexible justice. Mistakes in the management of industrial concerns often bring on strikes, working to the disadvantage of all concerned. The ordinary worker desires responsibility and when it is given him, much of his radicalism vanishes. Regardless of the efficiency of the foreman, the management must sell itself and its fairness to its men.

(Additional interesting discussions and some of the articles read will appear next week.)

News Of the Industry

Stockpiles of Soft Coal Near Peak Jan. 1 With 62,000,000 Tons

**Two Million Tons Added Since Oct. 1—Supply Would Last 46 Days at
Current Rate of Consumption—Retailers' Stocks of
Anthracite Increase 60 per Cent**

Consumers of bituminous coal had reserve stocks of 62,000,000 tons of that fuel on Jan. 1, 1924, according to a survey by the Bureau of the Census and the U. S. Geological Survey. The year just passed was one of practically uninterrupted accumulation of reserve stocks, and the inventory at its close revealed the following facts: Stocks on Jan. 1, 1924, were 2,000,000 tons larger than on Oct. 1, 1923, and about 6,000,000 tons larger than Sept. 1. In comparison with corresponding dates of preceding years, stocks on Jan. 1, 1924, were 72 per cent larger than in 1923, 29 per cent larger than in 1922, 35 per cent larger than in 1921, and even exceeded those on Jan. 1, 1919, by 7 per cent. In fact on only two dates for which stock records are available has the present supply been exceeded—Armistice Day, 1918, and April 1, 1922, on each of which dates stocks totaled 63,000,000 tons.

Measured in terms of tons, stocks increased 3.3 per cent during the last quarter of 1923. Measured in terms of days' supply, the increase was 2.2 per cent, the percentages being based on averages which assume that the supply was evenly distributed. In the estimate, which is based on reports from a selected list of about 5,000 consumers, no account has been taken of coal in the bins of householders, concerning which no statistics are available; nor steamship fuel, nor the tonnage on the Lake docks, which item is classed as coal in transit.

In addition to the quantity estimated as in storage piles of actual consumers, the following quantities are known to have been in transit on Jan. 1: On the commercial docks of Lakes Superior and Michigan, 7,800,000 tons; in storage

at the mines or at intermediate points, 390,000 tons; unbilled loads at mines or en route to consuming centers, 790,000 tons.

As shown graphically in Fig. 1, coal consumers had larger stocks at the beginning of 1924 than on any corresponding date for which records are available. In comparison with dates on which reserves were large, the stocks on Jan. 1, 1924, were 18 per cent larger than those on March 1, 1922, 28 per cent larger than those on Nov. 1, 1921, 35 per cent larger than those on Jan. 1, 1921, and but 2 per cent less than those on Armistice Day, 1918, when record stocks were available. The present stocks, even though less than at the close of the war, are more adequate, for the rate of consumption is now somewhat less.

Estimates based on the reports from consumers and supplemented by information from other sources indicate that consumption plus exports in the last quarter of 1923 was at the rate of approximately 10,200,000 tons per 7-day week.

Stocks in Days' Supply

Fig. 2, which is based upon data in the table herewith, compares the days' supply held by the seven principal classes of consumers on Jan. 1, 1924, with that on the same date two years ago. The importance of the rate of consumption in determining the adequacy of stocks is shown here, for had the rate of consumption on the earlier date been equal to that now prevailing, the supply on Jan. 1, 1922, would have been sufficient for less than 35 days instead of the 41 days shown.

The average stocks on Jan. 1, 1924, were sufficient to last 46 days, at the

rate of consumption in the last three months of 1923, against a 45-days' supply on Oct. 1. Despite the increase of 6,000,000 tons in actual tonnage, the supply on Jan. 1 was sufficient for only the same number of days as that on Sept. 1, 1923, owing to an appreciable increase in rate of consumption. In terms of days' supply the stocks on Sept. 1, 1923, and Jan. 1, 1924, are the highest recorded. It should be remembered, however, that any change in the consumption rate since Jan. 1 will be reflected in the days' supply.

Fig. 3 offers a graphic presentation, by states, of the variations in stocks. The map shows the days' supply held at general industrial establishments, excluding byproduct coke plants and steel works. This is the largest single group of consumers and the one that illustrates best the geographical distribution of reserves. Changes in business activity in this group are quickly reflected in the coal market, and likewise changes in the coal market are soon manifested in the stocks held by general industrials.

Over the country as a whole the stocks held by industrial plants on Jan. 1 were sufficient to last 55 days on the average, a decrease of one day from the supply on Oct. 1 and Sept. 1. Here, too, the importance of consumption is strikingly shown, for the actual tonnage held by this group on Jan. 1 was about 8 per cent larger than on Sept. 1. In comparison with Oct. 1, however, industrials had a somewhat smaller tonnage on Jan. 1.

The distribution of stocks between states, as shown by the map, is typical of dates when reserves were heavy and business active. The entire territory east of the Mississippi had at least a 30-days' supply, except in Illinois, West Virginia, and Maryland, coal-producing states where consumers are close to the mines. Reserves were heaviest in New England, the Upper Peninsula of Michigan, and the Atlantic Coast states. The smallest stocks, as usual, were in that belt of states which extends west from Illinois through the center of the country to the Pacific Coast, and in the

Days' Supply of Bituminous Coal in Hands of Various Classes of Consumers, Nov. 11, 1918, to Jan. 1, 1924 (a)

(Figures represent number of days supply would last at current rate of consumption at time of stock taking)

	Nov. 11, 1918	Jan. 1, 1919	Jan. 1, 1921	Nov. 1, 1921	Jan. 1, 1922	Mar. 1, 1922	Jan. 1, 1923	July 1, 1923	Aug. 1, 1923	Sept. 1, 1923	Oct. 1, 1923b	Jan. 1, 1924b
Byproduct coke plants.....	35	32	29	38	42	39	19	26	27	30	33	35
Steel plants.....	45	42	42	46	48	48	27	35	35	33	39	43
Other industrials.....	71	65	64	67	51	51	40	46	54	56	56	55
Coal-gas plants.....	85	81	55	87	89	89	60	89	104	110	91	91
Electric utilities.....	49	49	44	54	51	51	33	48	52	52	49	51
Coal dealers, bituminous.....	37	39	30	46	33	33	16	39	45	38	36	34
Railroads.....	31	32	23	31	35	35	16	28	39	44	41	44
Total bituminous.....	45	42	39	43	41	41	26c	37c	44c	46c	45c	46c

(a) The figures in this table are estimates based on incomplete data. (b) The rate of consumption used in calculating the days' supply on Oct. 1, 1923, and Jan. 1, 1924, was the quantity consumed from Oct. 1 to Dec. 31, 1923. (c) Subject to revision.

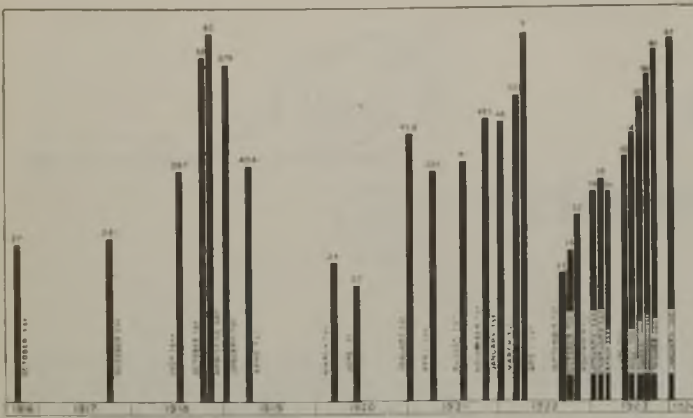


Fig. 1—Total Commercial Stocks of Bituminous Coal, Oct. 1, 1916, to Jan. 1, 1924

Figures represent million net tons and include coal in the hands of railroads, industrial consumers, public utilities, and retail dealers. Coal for steamship fuel, on Lake docks, in transit, and in the bins of householders is not included. These exceptions are important, the coal on wheels having proved at times a greatly disturbing factor in the calculations of would-be statisticians.

lignite-producing states of Texas and Montana.

The map in Fig. 4 compares, state by state, the tonnages held by industrials on Jan. 1, 1924, and on the same date in 1922. In 26 states stocks increased at least 5 per cent, whereas decreases to that extent occurred in but 14 states. Practically the entire eastern section of the country and the Southwestern States were particularly well supplied when compared with 1922, and appreciable decreases were confined to the Northwestern and Rocky Mountain States.

Reports from the electric-utility plants show perceptible increases in stocks during the last four months of 1923, but consumption increased to even a greater extent, and the 51 days' supply available on Jan. 1, 1924, would have lasted one day less than the supply on Sept. 1. The tonnage held by such plants on Jan. 1, 1924, was considerably larger than on that date in 1922, but owing to the greatly reduced demand for electric power then prevailing, the smaller stocks were sufficient for the same number of days' consumption.

Reserves at coal-gas plants increased

somewhat during September, and remained practically stationary during the remainder of the year. The days' supply of gas coal decreased sharply from 110 days' on Sept. 1, to 91 days' on Jan. 1. This decline may be attributed to the usual seasonal increase in the demand for gas during the fall and winter months. In spite of the decrease, stocks on Jan. 1 were larger than on any corresponding date for which figures are available.

Complete returns from the byproduct coke and steel plants showed the following reserves on Jan. 1, 1924, at the rate of consumption prevailing from Oct. 1 to Dec. 31, 1923, and on Jan. 1, 1922:

Byproduct Plants		
	Jan. 1, 1924	Jan. 1, 1922
Low volatile.....	41 days	54 days
High volatile.....	33 days	38 days
Average.....	35 days	42 days
Steel Works		
	Jan. 1, 1924	Jan. 1, 1922
Steam coal.....	35 days	41 days
Gas coal.....	60 days	58 days
Average.....	43 days	48 days

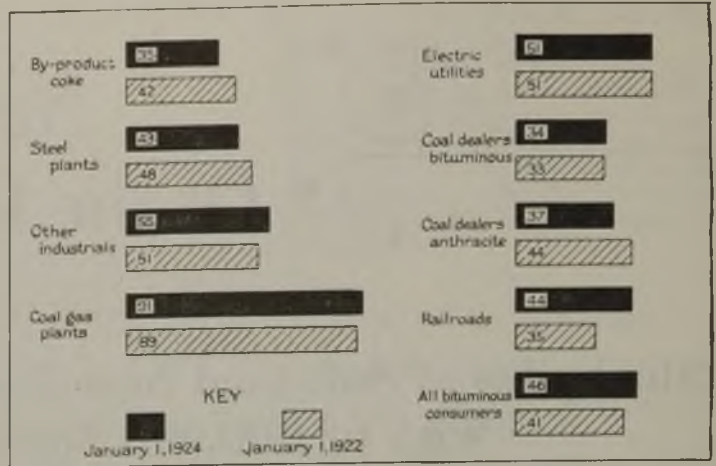


Fig. 2—Days' Supply Held by Different Classes of Consumers, Jan. 1, 1924, and Jan. 1, 1922

At the rate soft coal was burned in the last quarter of 1923, total stocks on Jan. 1 were sufficient to last 46 days, an increase of 1 day over the supply on Oct. 1. Stocks on Jan. 1, 1922, were sufficient to last 41 days at the rate of consumption then prevailing.

In terms of tons byproduct coke plants had a 40-per cent larger reserve on Jan. 1, 1924, than on that date two years ago, and the stocks at steel plants were 7 per cent larger. The larger stocks were more than offset by the increased rate of consumption in 1923, and when expressed in days' supply the reserves at byproduct plants fell 17 per cent, at steel plants 10 per cent.

The railroads accumulated coal steadily during 1923, and on Jan. 1, 1924, had on hand an enormous total of approximately 19,000,000 net tons, the largest quantity ever recorded, excepting only stocks on April 1, 1922, when the railroads had stored about 19,800,000 tons in anticipation of the strike. This supply, which includes the coal in stockpiles, cars and chutes, was sufficient to last 44 days, a supply equal to that on Sept. 1, 1923, despite the regular seasonal increase in consumption.

The demand for soft coal for household purposes increased sharply with the arrival of winter weather, and stocks held by retailers declined from 38 days' supply on Sept. 1 to 34 days on Jan. 1. The reserves held by retailers at the beginning of the year com-

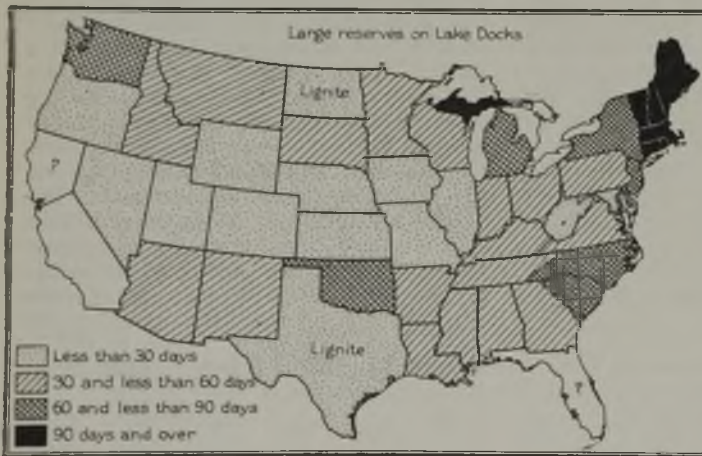


Fig. 3—Days' Supply of Bituminous Coal on Hand at Industrial Plants, Jan. 1, 1924

At the average rate of consumption that prevailed during the last quarter of 1923, reserve stocks at industrial plants, other than steel and byproduct coke, would have lasted on the average 55 days. Of the states east of the Mississippi only West Virginia and Maryland had less than a 30-days' supply. New England and the Upper Peninsula of Michigan had supplies sufficient for 90 days or more. Based on reports from 2,210 plants.

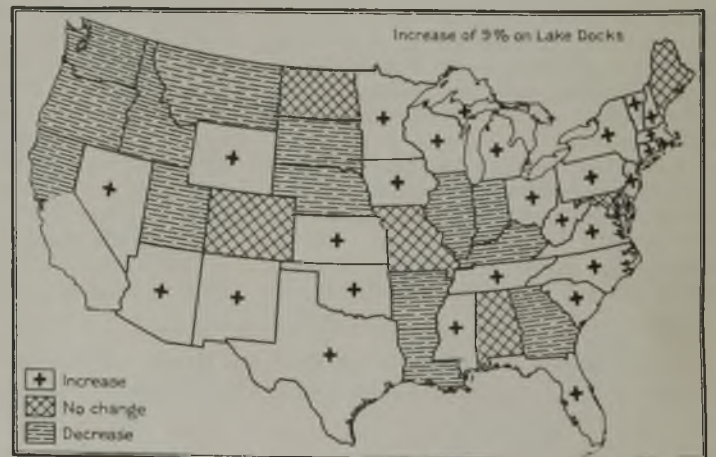


Fig. 4—Stocks of Industrials on Jan. 1, 1924, Compared With Those on Jan. 1, 1922

The map shows the changes in tonnage on hand at 1,846 identical industrial plants other than steel and byproduct-coke works. Industrial plants have steadily added to their reserves since the close of the miners' strike in 1922. In 26 states the quantity held on Jan. 1, 1924, was larger than it was on the corresponding date two years ago, when coal was being accumulated in anticipation of a strike.

pared favorably with those on other winter dates.

Lake navigation remained open unusually late in the season just passed, and receipts of soft coal during the last quarter of 1923 exceeded shipments off the docks by 14 per cent. Stocks on Jan. 1, 1924, were 7,805,533 tons compared with 6,861,706 tons Oct. 1, 1923.

Reports from an incomplete list of producers who store, showed that the quantity held by them decreased from 440,000 tons on Sept. 1, to 375,000 tons on Oct. 1 and 385,000 tons on January 1. Unbilled coal standing in cars at the mines increased from 470,000 tons to 786,000 tons in the same period.

Stocks of coke at byproduct coke plants decreased from 501,000 net tons on Sept. 1 to 476,000 tons on Oct. 1. Coke was accumulated during the last quarter of 1923, however, and on Jan. 1, 1924, the total on hand was 772,000 tons. This is the second largest figure on record, being 22 per cent less than that for March 1, 1922, the date of record stocks of coke.

Anthracite—Retail dealers' stocks of anthracite increased during the last three months of 1923, and their total supply on Jan. 1 was about 60 per cent more than on Oct. 1. Reports from the docks on Lake Superior and Lake Michigan that handle anthracite showed a total of 513,000 tons on Jan. 1. The production of anthracite was interrupted by a general anthracite miners' strike for about two and a half weeks in September and by the occurrence of holidays in November and December. Demand for domestic sizes continued brisk up to the close of the year, and the mines worked close to capacity whenever possible. Since Jan. 1, production has fallen off slightly.

Facts relating to production and retail dealers' deliveries indicate that householders' stocks probably are normal for this time of year. The tonnage produced flowed steadily to the consumers practically as fast as it could be mined, and retailers were not able to build up their reserves to normal until midwinter.

Retailers' receipts exceeded their deliveries during the last three months of 1923, and their reserves on the first of the year had increased sharply over those on Oct. 1. It has not been possible to make a canvass of all the coal dealers, but reports from a group of 474 who have reported regularly since Jan. 1, 1919, show a total of 1,063,277 net tons on Jan. 1, 1924, against 663,340 tons on Oct. 1. This was an increase in tonnage of approximately 60 per cent. In terms of days' supply the increase was 60 per cent.

Stocks of anthracite on the upper Lake docks increased during the last three months of 1923, the total on Jan. 1 being 65 per cent larger than on Oct. 1.

Production of bituminous was maintained at a high rate during January and February, and it seems probable that coal has continued to flow into storage. Anthracite production has declined slightly since Jan. 1, and as severe winter weather has prevailed in many parts of the country, it seems likely that retailers' stocks have decreased somewhat.

Western Kentucky Consolidation

Frank D. Rash, president of the St. Bernard Mining Co., of Earlington, Ky., announced on Feb. 19 that there is a deal pending, which probably will be closed within thirty or sixty days, for the sale of his company's property in western Kentucky to the North American Co., of New York, owners of much public-utility and associated property throughout the Middle West, including the West Kentucky Coal Co., of Sturgis, Ky., with eleven western Kentucky mines. This deal would bring the two largest west Kentucky mining groups under one control. Mr. Rash is to remain with the company.

Denies Scandal in Transfer Of Alaska Coal Lands

Colonel John R. Steese, of the U. S. Army Engineers and chairman of the Alaska Railroad Commission, who was in Buffalo Feb. 18 to speak to army men, said that there was nothing illegal or scandalous about the transfer of Matanuska coal lands from the Navy Department to the Interior Department. He labeled as "bunk" the charges made by John E. Ballaine, Alaska Railroad contractor, in a letter to President Coolidge, that the transaction paralleled the Teapot Dome affair.

"After the Navy Department had spent about \$1,500,000 in the development of these coal regions, the big oil discoveries of 1914 were made in California," said Colonel Steese. "The navy decided then to use oil as fuel and power in the Pacific fleet, because of the reduced price of oil, and as a result abandoned the Matanuska coal regions. The natural consequence of the abandonment of these lands was that the lands were then classified as 'public domain' and properly referred to the Department of the Interior. As I understand it, Secretary Fall, while head of the Department of the Interior, attempted to dispose of the coal lands to private interests, but in a proper, legal manner.

"The lands were public domain and any private persons or corporations could acquire a lease to the regions under a leasehold from the Department of the Interior."

Factory Will Make Mine Loaders Exclusively

Because of the importance of mechanical loading, a factory exclusively devoted to the manufacture of underground loading machines has been provided by the Joy Machine Co. A celebration was held Feb. 9 to mark both the completion of the first of its new heavy-type loading machinery and the opening of the factory at Evansville, Ind. The company claims that this is the first factory dedicated to the sole purpose of producing this important adjunct to mining equipment. Already 200 Joy loaders are in service.

Supreme Court Sets Aside Addy Conviction

Conviction of the Matthew Addy Co. and Benjamin N. Ford, its vice-president, on charges of violating the Lever Act by selling coal at a higher margin than fixed in the Presidential proclamation of Aug. 23, 1917, was set aside by the U. S. Supreme Court in a decision rendered Feb. 25. The defendants are coal jobbers of Cincinnati.

Under a contract dated July 31, 1917, the defendants bought coal from the Bluefield Coal & Coke Co. at \$3.25 per ton f.o.b. mine in West Virginia. They were convicted of selling some of this coal in August and September, 1917, at \$3.50 per ton, f.o.b. mine. The margin fixed for jobbers in the Aug. 23 proclamation of the President was 15c. per ton.

In reversing the District Court and the Circuit Court of Appeals, the Supreme Court declared that the proclamation of Aug. 23 was not retroactive and that the transaction was begun before the proclamation was issued. "No imperative reason appears for treating jobbers who had bought but who had not contracted to sell with less consideration than was accorded those with agreements for sale irrespective of the stipulated price," the opinion stated.

Sandefur-Canoe Creek Case To Be Argued April 7

The Supreme Court Feb. 25 granted a motion to advance the case of S. C. Sandefur against the Canoe Creek Coal Co. and assigned the case for argument on April 7. Sandefur was convicted of contempt of court by the U. S. District Court of Western Kentucky for violating an injunction restraining strikers from interfering with employees of the coal company. He demanded and was refused a jury trial. The Circuit Court of Appeals of the Sixth Circuit, to which an appeal was taken, has asked the Supreme Court for instructions as to whether Sec. 22 of the Clayton Act, which requires a conviction upon a jury trial as a condition precedent to punishment for contempt, upon demand for a jury in the case specified, imposes a valid restriction upon the inherent judicial power of the U. S. district courts, as the appellant insists. It is upon this point that arguments will be made in April.

Another African Coal Field

The discovery of coal at Stamprietfontein, about forty-five miles from Marienthal in the mandate territory of Southwest Africa, has been reported. The seam is said to be 14 ft. thick and was discovered at a depth of 143 ft. in one of the government boreholes. It has been traced for four or five kilometers, but the exact area of the coal field is uncertain. Some doubt seems to prevail as to the successful development of any coal discovered in Southwest Africa, the chief difficulties being those of transport and the question of labor, as the local natives (negroes) are much averse to working underground.

Dominion Miners Ratify Pact And Return to Work

The pact between the provisional executive of the United Mine Workers for the eastern Canada district and the British Empire Steel Corporation (Dominion Coal Co.) has been ratified by most of the miners who went on strike for increased wages one month ago. The question was voted on by the various locals in the United Mine Workers for the affected territory, and the striking miners decided by a fairly large majority to return to work. The agreement between the executive and the company heads provides for a 5 per cent increase in wages and no reduction in the banking periods.

The Stellarton local, one of the most powerful locals in the district, voted strongly against returning to work and demanded the return of the 1921 wage agreement. Provisional President Barrett and International President Lewis were assailed at the various meetings held by the miners. Phalen local, of Glace Bay, although scoring the officers and eulogizing the deposed secretary, J. B. McLachlan, now serving a two-year term in Dorchester (N. B.) prison, the most radical local of all, agreed to return to work. Provisional President Barrett threatens to expel the Stellarton local unless the members of that local return to work within ten days.

Rocky Mountain Engineers Talk Safety

Safety first, last and all the time was the central theme of the 18th regular meeting of the Rocky Mountain Coal Mining Institute, at Denver, Feb. 13 to 15. It was the keynote of President George B. Pryde's address on Wednesday morning, the opening day, and it ran on down through most of the program, although other matters also were covered.

On Wednesday afternoon papers were read by L. S. Ickis on "Automatic Substation Control," relating primarily to equipment for automatically regulating rotary converters and motor-generator sets. Mr. Ickis' paper, and that following, "Beautification of Industrial Towns," by S. R. De Boer, a prominent landscape architect of Denver, were illustrated by lantern slides.

Mr. De Boer's discussion was particularly interesting to the Wyoming delegates, who see so little of trees at home. Mr. De Boer stated that a considerable amount of beautification could be done at a small expenditure. He also discussed the planning and arrangement of small cities.

Following Mr. De Boer, Thomas Foster, superintendent of the Union Pacific Coal Co.'s operations at Reliance, Wyo., read a paper entitled, "Coal Dust in Mines." This is a live subject to the mines in the Rocky Mountain region, where the air is so dry.

The banquet to members and their ladies was given Wednesday evening in the Cathedral room of the Albany Hotel. Pliny F. Sharp, one of the youngest old members of the organization, presiding as toastmaster, kept his audience in high humor introducing E.



Joseph Struthers

Secretary of the Engineers Club and former secretary of the American Institute of Mining and Metallurgical Engineers, who died of pneumonia, Feb. 18.

N. Weitzel, a past president; George B. Pryde, president, and Colonel Philip S. Van Cise, the District Attorney for Denver, so well known in the West for his recent conviction of the infamous Bunko gang. Colonel Van Cise spoke on "The Problem of the Criminal."

The Rocky Music Coal Players then presented "The Silly Selling Singers Symphony," in "The Coal Bloc, a Ton of Unscreened Fun," written by Nobudi Will Admittit, arranged and directed by Forrest Rutherford. "The Coal Bloc" is a one-act comedy detailing a meeting to nominate a candidate to represent "coal" in the coming presidential race. After the show, a large crowd remained to dance.

The Thursday morning session began with the report of the Safety Committee; President Pryde, chairman. The report was thoroughly discussed by many members. In the afternoon, R. L. Hair, division superintendent of the Colorado Fuel & Iron Co., described the "Mine Sprinkling" methods in use by his company. Dan Harrington, of the U. S. G. S., told of the safety measures being taken at the Phelps Dodge Co.'s mines at Dawson, N. M. He described the Dawson mines as the safest he had ever seen.

The Friday morning session was devoted to the reading and discussion of a paper on "Use of Overcutting Machines," by T. A. Stroup, superintendent of the Utah Fuel Co.'s Clearcreek mine. Friday afternoon the following officers were elected: President, William Littlejohn, general superintendent of the Utah Fuel Co.; vice-president for New Mexico, Horace Moses, general manager of the Gallup-American Coal Co.; vice-president for Wyoming, E. S. Brooks, vice-president and general manager of the Union Pacific Coal Co.; vice-president for Colorado, James Dalrymple, State Mine Inspector; vice-president for Utah, John Forrester, chief engineer of the U. S. Fuel Co.; secretary-treasurer, Benedict Shubart, of Denver.

U. S.-British Co-operation Sought for Mining Safety

While there are barriers, real or imaginary, to close political co-operation between nations, there are no obstacles to close international relationships between those engaged in technical and scientific work. This is one of the thoughts developed by speakers at a luncheon, Feb. 25, tendered Dr. R. V. Wheeler and W. R. Chapman by George S. Rice, chief mining engineer of the U. S. Bureau of Mines. Dr. Wheeler and Mr. Chapman are in this country to complete arrangements for a definite program of co-operation between the United States and British governments on matters pertaining to safety in mining. Dr. Wheeler is director of the British Government's experiment station at Eskmeals and is professor of fuel technology at Sheffield University. Mr. Chapman is a chemist attached to the technical staff at Eskmeals. Henry Walker, deputy chief inspector of mines for Great Britain, who will assist in these arrangements, had not arrived in America in time to attend this luncheon.

In the course of remarks at the luncheon, Director Bain, of the Bureau of Mines, pointed out that when the Bureau of Mines was created its research program was based to a considerable extent on information that had been developed by the British. Since that time there has been some informal co-operation between the Bureau and the British agencies engaged in similar work. Much good, he said, had resulted from the informal work and it gives a measure with which to estimate the much greater benefits likely to flow from the formal relationship which now is being entered upon. He spoke of the desirability of close relationships along professional lines.

Dr. Wheeler, in his remarks, declared that the Bureau of Mines has been the ideal toward which comparable activities of the British Government are striving. It has been only since the passage of the Mining Industries Act, he explained, that the British agencies have been in a position to hold up their end of such a proposition, the act providing funds for research.

Again Ask Change of Venue In Armed-March Case

As in other counties, where cases growing out of the armed march of 1921 in southern West Virginia have been tried, the defense in the case of the State of West Virginia against C. F. Keeney, president of District 17, United Mine Workers, as a last resort has applied for another change of venue and sought permission of Judge J. W. Eary in the Circuit Court of Fayette County to obtain affidavits to show that the defendants could not obtain a fair trial. The motion was overruled by the court on the ground that the defense had already had ample time to obtain such affidavits without waiting until the time set for the trial. The cases have dragged along for three years largely as a result of frequent changes of venue.

Long Step Toward Stabilization in 3-Year Contract Is Washington View

Regret Felt That It Fails to Provide for Modifications as Conditions Change—Keen Competition Likely to Cause Rapid Elimination of High-Cost Mines

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

The three-year contract agreed to by miners' union officials and soft-coal operators of the Central Competitive Field is regarded in Washington as a decided step forward. The ideal condition, in the opinion of most officials who have special knowledge of coal, is to have long-time contracts, but with provision for a certain amount of flexibility to take care of changing conditions. Regret is expressed that no start was made in that direction in this contract. It is believed generally, however, that experience under this contract will be such as to pave the way for the automatic rise and fall of wage scales to follow the real value of money.

All are agreed that the next three years will be ones of strenuous competition and painful readjustment. Competition already has reached a point that calls special attention to the great expansion which has taken place during the past seven years in the coal-producing industry. The elimination of high-cost mines will proceed at a much more rapid rate from this time forward.

The situation has brought with it a demand that the industry keep watch on the rate of its own expansion. It is suggested that the National Coal Association could perform a helpful service to the industry and to the public if it were to compile and keep up currently basic information with regard to the opening of new mines. It is believed that in normal times comparatively few new mines would be opened if the total amount of expansion in progress were known. Even under present prospects when many relatively low-cost operations are facing an uncertain future, it is known that new mines are being opened and that many other new mines are in prospect.

If the real facts were known, it is believed that the operators themselves would be inclined to defer new enterprises, but the principal influence of exact information would be in retarding the banks and other financial interests from backing such propositions.

The situation with regard to new coal mines is much like that which overtook the raisin growers. A few years ago, they took advantage of a propitious situation to boost the price of their product to an artificially high level. This caused existing vineyards to expand their acreage and induced an army of farmers to embark in vine growing. The resulting overproduction led to staggering losses.

In many industries the financing is so centralized that a careful check is kept on expansion. Most new coal mines are financed in the immediate locality. The backers, as a rule, have no conception of the number of properties being opened in similar fashion. It takes a couple of years for a new

coal mine to reach the point where it really begins to produce. By that time it may be evident that there is overproduction of coal, but then the capital investment is so great that production must proceed at the sacrifice of profit and in some instances at actual loss.

With the situation which now impends there is new reason for information in regard to new mines to be generally available. Production has proceeded for a long period without interruption. Stocks are large and three years of peace stretch ahead. In addition the country's consumption of coal is not increasing at the same rate maintained during the twenty years preceding 1919. The higher coal prices which have prevailed over a period of seven years have turned the attention of the consumer to economies in the use of coal. It formerly was so cheap that there was no incentive to attempt to eliminate waste.

The elimination of waste in fuel, however, now has reached the point where it is almost the rage. Very material economies have been effected. The Geological Survey reports show, for instance, that during the last five years there has been a reduction of 25 per cent in the amount of coal necessary to produce a kilowatt hour. The coke industry has gone from a beehive to a byproduct basis. The gas that once was wasted is now being burned under boilers and in furnaces. The International Railroad Fuel Association points to some very striking savings in the increased number of locomotive miles attained. A great wave of hydroelectric development is under way. The enormous production of petroleum has a deeper significance than the actual coal displaced by fuel oil. It has curtailed a large amount of new business which would have come to the coal com-

panies. An example is the retarding of electric line development, due to the use of the automobile. The bunker business is rapidly being lost.

All of these things taken together have resulted in a decided flattening of the curve indicating the average rate of increase in coal consumption.

Under contracts of one and two years, strikes or suspensions were frequent enough to have some stimulating effect throughout the period of the contract. They offered enough encouragement to the new small mine to keep the crop large. The hope now is to acquaint the prospective operators of such properties with the fact that a very different situation now faces such enterprise. If this can be brought home to them, it is recognized that a long step toward stabilization will have been taken.

British Columbia Gloomy Over Coal Industry

"Disabilities and Problems of the Coal Mining Industry of British Columbia" was the subject discussed at the opening session of the annual meeting of the Canadian Institute of Mining & Metallurgy (British Columbia Division) held at Vancouver Feb. 13-15. The addresses of Charles Graham, of the Canadian Collieries (D) Ltd.; C. M. Campbell, of the Cassidy Collieries, Granby Consolidated Mining & Smelting Co.; J. P. Biggs, of the Mines Department, and R. M. Young, of the Crows Nest Pass District, were somewhat gloomy in their general tone.

Owing to fuel-oil competition, the decrease in the export trade and the carriage of coal in ballast by vessels coming to Vancouver City for cargo, the industry, it would appear, is passing through a crisis. Mr. Graham pointed out that the provincial production in 1923 was 600,000 tons less than in 1910 notwithstanding an increase in population and in manufactures.

Reference also was made to the cost of production in the Comox district of Vancouver Island, chiefly because of the shale found with the coal. In speaking of the speculative character of development it was said that an instance had occurred where three boreholes a considerable distance apart apparently had tapped a 17-ft. seam of coal, but when actually opened up it was found that in each case the drill had struck a pocket and all the expenditure had been lost.

Mr. Campbell dealt with the Cassidy Mine. Half of the area being exploited, he said, did not contain coal and the coal measures were badly faulted and the development expenses very heavy. As to the Nicola-Princeton field, it was stated by Mr. Biggs that, though there were no very extensive deposits, the area was important. Production in 1923 had been 233,000 tons.

Discussing the Crows Nest field it was said by Mr. Young that the once prosperous industry there had been hurt by reason of the adoption by American railroads of fuel oil. It also had suffered through the removal of the Granby smelter from Grand Forks to Anyox and by the substitution of electricity for coal at the Trail Smelter.

Wage Cutting in This Field?

The Kentucky-Tennessee Coal Operators' Association and the United Mine Workers have been unable to agree on a new wage contract for operations in southeastern Kentucky and eastern Tennessee, the operators refusing to renew the old contract as a result of being in a field that is not fully organized and that is in competition with several unorganized fields. Over the past several months the union agents have been working hard in an effort to organize the miners in the Harlan, Pineville, Middlesboro and surrounding districts, but have not made much headway.



Practical Pointers For Electrical And Mechanical Men



Application of the Diesel Oil-Burning Engine to Coal Mining

About a year ago I was called upon to make a recommendation for a power unit at a coal mine. After looking over the requirements and conditions at the mine I decided that a Diesel oil-burning engine would be entirely suitable and could be used at low cost, at the same time obviating the necessity for expensive maintenance. The engine therefore was installed and has since proved quite successful, but the application of the Diesel engine to a mine power plant is so novel that the question might reasonably be asked, why use a Diesel engine at a coal mine?

To answer this question a short description of the plant may be necessary. The mine is the property of the Laurie Coal Co. located at Vaughan, Nicholas County, W. Va. The power unit is a 125-hp. three-cylinder Selzer-Bush Diesel engine, direct-connected to a 75-kw. 220-volt direct-current Westinghouse generator. Compressed air at 700 lb. pressure is used for starting and is supplied by an Ingersoll-Rand compressor belted to the flywheel of the engine, and stored in four tanks. Fuel oil also is stored in a nearby tank and fed to the engine as required.

The selection of this equipment was based upon economy and simplicity of operation and low maintenance costs.

Economy of operation is the outstanding feature of this power plant. An ordinary isolated steam power plant required for producing the power requirements of this mine would use about 5 tons of coal per day, which at \$2 per ton would make a total of \$10 a day for fuel. The Diesel engine described above consumes 29 gallons of fuel oil per day, which at 6c. per gallon costs \$1.74, a saving of \$8.26 per day, or \$65.20 for a working month of 20 days.

The steam plant would require an engineer and fireman at a total cost of about \$300 per month, whereas the Diesel engine requires the attendance of one man at a cost of about \$175 per month, a saving of \$125 per month. Therefore the fuel and labor saving is \$290 per month or \$3,480 per year.

The operation of the plant is very simple, the engine is started and stopped at will and requires only the turning on of the air and fuel valves and regulation of the mixture to operate it between the limits of no-load to full-load. With a steam plant the boilers must be started some time be-

fore the plant can turn out electrical energy, the delay being from one to five hours, depending upon whether the fires must be newly started or have been previously banked. Compared with the steam engine with its power plant the Diesel engine has few moving parts and is readily accessible for repairs.

The maintenance costs for a Diesel engine are unusually low; repairs consist of replacing small parts and the work can be done very quickly when compared with the time required to take a boiler out of service and make the ordinary repairs which must be made to a boiler plant.

With these many advantages in its favor the application of the Diesel engine at the afore-mentioned mine has proved quite successful and the experiences here no doubt will help to establish its use in the mining field.

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Charleston, W. Va.

Tests of Insulating Varnishes

Standard tests have not been developed to measure all the qualities of varnishes but all the important controlling characteristics can be measured and the others approximated from observation and comparison. As no varnish can possess all the desirable qualities to the maximum extent, it is necessary to consider the varnish from the standpoint of the use that is to be made of it and interpret the test results with the view of selecting the most suitable varnish for the purpose in mind.

Specific gravity is a measure of the weight of varnish in relation to that of water. The determination gives a figure that expresses this weight but does not take into account the factors that make it up. High specific gravity might indicate by itself either a high percentage of base (oils and gums) or a solvent of high gravity combined with a normal percentage of base. It is not an indication of the volume of covering or filling material per gallon, or, in other words, of the proportion of base and solvent.

Viscosity is of principal value in comparing samples of the same or similar varnishes. This characteristic is greatly affected by the heat treatment given the oils in the varnish and is not a true indication of the

proportion of base and solvent. It is, however, an important factor affecting the thickness of coating produced by the varnish.

Flash point indicates the probable nature and volatility of the solvent or, in the case of varnishes having a blended solvent, the volatility of the most volatile flammable ingredient.

The evaporation test indicates the relative quantities of solvent which will be lost through evaporation and which will have to be replaced to maintain the varnish at the proper consistency in the dipping tank. This is a factor affecting the cost of using the varnish.

We now come to the point where we must consider the changing features of the varnish as it passes through its other phases toward hardening. As a general rule, the varnishes are applied by dipping until the pieces treated are well saturated. They are then withdrawn from the bath and allowed to drain until the setting stage is reached. At this stage some of the solvent has evaporated and the viscosity of the varnish base is sufficient to stop the flow.

The draining test is of great value in indicating the working characteristics of the varnish during this time. It is important that the various elements be so combined that the thickness of film on surfaces and the volume throughout a mass be as evenly distributed as possible from top to bottom. Of course, mechanical means, such as turning the pieces, may be resorted to, but this takes time and adds to production cost. In such arrangements as conveyor ovens it is next to impossible.

The thickness of coating is controlled by the viscosity, percentage of base, volatility of thinner and speed of withdrawal. When a coil is withdrawn from the varnish, the quantity of liquid varnish then adhering to it is governed by the original viscosity of the varnish itself and the speed of withdrawal. As draining begins, the relation of values is constantly changing, due to the continual evaporation of the solvent, until the time comes when enough solvent has evaporated to allow the inherent strength of the varnish base to maintain stability. Then movement ceases and setting really begins to produce a final outside film which gradually hardens.

It should be remembered in this connection that rapidly evaporating solvents give a shorter flow, and varnishes containing them show a greater increase of deposit from top to bottom of the treated piece, while heavier sol-

vents tend to give longer flow and therefore a more uniform thickness of coating. A solvent of too high a distillation range would introduce objectionable features. For instance, it might slow the drying and affect the enamel or enameled wire.

The time-of-drying test is important, as the results of the other tests may be affected greatly by it. Varnishes dry by evaporation of the solvent and oxidation and polymerization of the oils. Oxidation begins at the surface and progresses inward. Most varnishes contain drying agents to accelerate oxidation, and, due to differences in composition, the drying characteristics may not be the same.

A strong drying action may produce surface drying, which would be indicated by a hard surface free from tack and soft unoxidized varnish underneath. This is an undesirable characteristic and in determining the drying time and preparing the test specimens, precautions should be taken to make sure that the varnish is hardened throughout. Testing the film with the finger nail and examination of the bead or fatty edge give some indications as to the degree of skin hardening as compared to that throughout the mass. It is to be noted that hardening is progressive and continues to the point of final break-up of the varnish at the end of its usefulness.

Dielectric strength, unfortunately, cannot be determined as accurately as would be desired. Although in the tests two dip coats producing four separate films of varnish are specified, it is difficult to obtain a perfectly uniform continuous coating. Dust present in the varnish, or settling on the test specimens while draining, and small air bubbles will produce minute perforations in the film and lower the dielectric strength. The degree of baking also has an important bearing on the dielectric strength. As the varnish hardens through baking, the dielectric strength increases, and in making this test it is important that all varnishes be hardened to the same extent. All films must be of the same thickness, as thinner films harden better and show a higher dielectric strength per mil.

The water-absorption test is of great value, probably being second only to the heat-endurance test. While it is subject to the same conditions affecting the dielectric-strength test, the latter test affords a correction factor, for the reduction in dielectric strength due to immersion in water is the basis of comparison in the water-absorption test. It is important that the films be of the same thickness and of the same degree of hardness. The loss in dielectric strength apparently is governed by the depth to which the water penetrates and the measured dielectric strength is in reality the dielectric strength of the unpenetrated film. A heavier initial film will give a higher dielectric strength, as there will be a greater thickness of unpenetrated varnish at the expiration of the 24-hour period.

Heat endurance is of great importance and is only relatively indicated by the test. The test is a measure of the time a film of given thickness may be baked and still not break when

stretched a specified amount. It is an indication but not an exact measure of the life of the varnish in actual service. In making the bending test, it is important that the test specimens be cooled to the proper temperature and bent over the rods in a uniform manner. If the test specimen is bent quickly, the varnish film will crack more readily, and the test specimens must be bent around the rods at the same speed to obtain comparable results.

The acid, alkali and oil-resistance tests are in the same category with the water-absorption test and are equally important. While, of course, varnishes may be chosen for their resistance to any one of these products, the ideal varnish would withstand all to the greatest possible degree because it is used to protect the rest of the insulation. In general, varnishes containing fairly high percentages of asphaltic ingredients best resist the action of acids, alkalis and water, while those which are high in the drying oils are found to be the most oilproof.

Acids tend to further oxidize the oils until they are finally burned; alkalis tend to saponify them. The black gums are seemingly very little affected by either and are generally hydrofuge. The hardened oils, however, are only slightly affected by transformer or lubricating oils and even by their original solvents. The oil resistance of any varnish is increased by overbaking. In such a case, one can even obtain an oilproof coat from a varnish containing practically no drying vegetable oils. It is essential, therefore, that the tests for oil resistance be made

on varnishes baked to a uniform degree of hardness in relation to their surface drying times.

The test for non-volatile matter is an indication of the proportion of base and solvent by weight. Varnishes are sold by volume and this test does not indicate the proportion by volume. It is of value in making comparisons only where the varnishes tested are of the same type and have solvents of the same specific gravity. The heavy-gravity solvents show a lower percentage of base when computed by weight, and as the varnish manufacturers use solvents of widely varying specific gravities this test should be used with discretion. It is of value and is frequently incorporated in specifications covering the same or similar varnishes.

Bending of Copper

All bends in copper should be made free and easy, that is, they should be given as large a curvature as is possible in the space available. Where sharp bends and sharp fillets are made, the effects of vibration, expansion and contraction, or the throwing out forces due to rotation show up first.

Frequently sharp bends are made at the ends of copper strap field coils and when making the clamped or soldered joints, in many cases the bad conditions that have been set up are overlooked. The sharp bend, or kink, may later be the cause of a motor failure which could easily have been avoided. It often happens that the armature-coil failure is at a point where the wires have been carelessly bent or crossed.

Bonding to Full Capacity Of Mine Rail

The power lost in the return circuit from direct-current motors used in the mines is no doubt greater than that lost in all the alternating-current circuits feeding other machinery. The track-circuit loss in street-railway systems is so well recognized that it is often claimed that any excessive loss in the track circuit will put a street railway company into bankruptcy.

The track system of many mining companies far exceeds that of a large street railway and the operating conditions are far more severe, and consequently power losses may easily become very great. Poor track bonding causes so many accidents, delays and serious troubles to the mining men that it is difficult to know where to begin to enumerate them. Equipment failures, high maintenance costs, high capital charges and high power bills are only a few of the worst results of poor bonding; in fact it affects the

whole operation of the mine from the morale of the workmen to the cost per ton of coal.

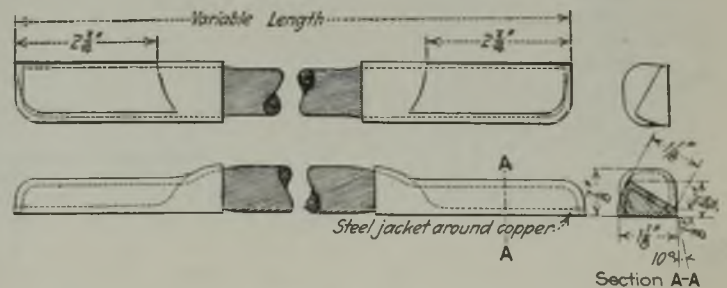
Money spent to provide good bonding soon comes back with large dividends and those men who realize this fact are forever striving to better their mine track conditions. In this respect many engineers are divided on this question into those who believe in bonding the track to the full capacity of the rails and those who rely more on return circuit cables.

Where heavy rails are used the Pennsylvania Coal and Coke Corporation of Cresson, Pa., has lately adopted the use of an extra heavy bond having a capacity equal to a 350,000 c.m. cable. This bond has been installed with great success and is being applied extensively. No difficulty has been experienced by its use, and voltage tests previously described in *Coal Age* have shown good results.

The illustration shows the type bond now being used. The terminals are steel jacketed and are easily applied to the rail by electric welding.

Large Capacity Rail Bond

This rail bond is designed so as to obtain the full current-carrying capacity of the rails and thus greatly reducing the expense of large return cables.





Production And the Market



Conservative Spirit Pervades Soft-Coal Market; Many Consumers Are Relying on Stockpiles

Buying of coal moves along conservative lines, having settled down to a hand-to-mouth basis in some markets, particularly where anthracite domestic sizes are consumed. The Jacksonville agreement assures peace in the Central Competitive Field for the next three years. Users of hard coal will buy during the next month only to meet immediate needs, as there is no new wage agreement to be negotiated. The little activity and hopefulness that was apparent in the soft-coal industry has nearly disappeared and a spirit of pessimism has taken its place to a degree. Buying has dropped and consumers to all appearances have decided to use their reserve stocks in order to avoid a recurrence of fires in stockpiles which caused more or less trouble last fall. The new working agreement has blasted the hopes of many non-union mine owners who had hoped to realize high prices for their product if there should have been a cessation of work in the union mines. Consumers' stocks on Jan. 1, according to government estimates, totaled 62,000,000 tons.

The average price of soft coal, according to *Coal Age* index dropped 2c. to \$2.23 with an index figure of 184, as of Feb. 25, compared with 186 the previous week.

Cold Weather Has Only Limited Effect

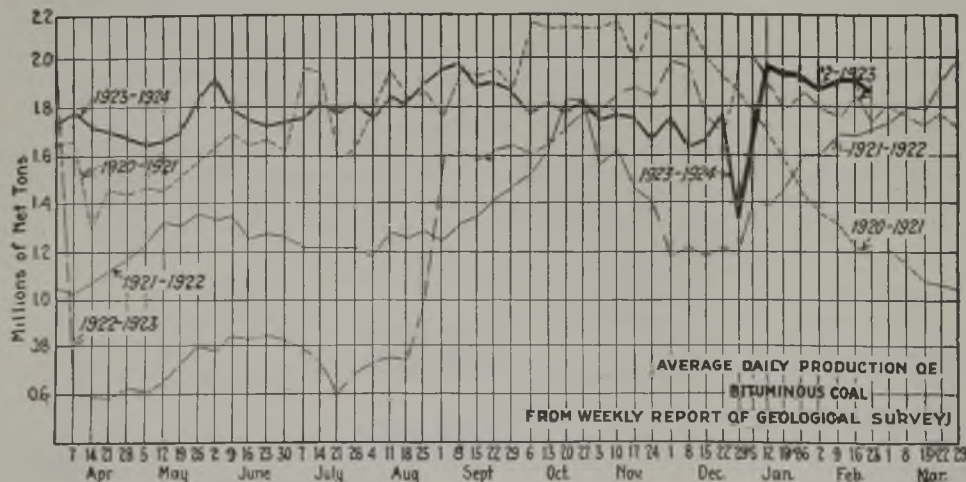
Consumption has been helped in nearly all markets by better coal-burning weather, but there has been comparatively little improvement in general demand. In the Middle West dealers report little buying and demand is generally inactive. Cold weather stimulated the call for domestic lump coal while there is enough screenings available to take care of the demand. Illinois mine owners have "no bills" for all sizes excepting screenings. The mines in the Carterville region are kept in operation because of the continued cold weather

and there is a good demand for Mt. Olive and Standard field coal. No change is reported from St. Louis, where retail dealers are kept busy with the middle grade coals. Demand for Kentucky product is good and some eastern Kentucky mines are sold up for the present. The Jacksonville agreement has injured the prospects of many of these mines, as a general strike or suspension would have meant good prices for these coals.

In the Northwest there is a steady call for coal. The feature of the Duluth market last week was a cut of \$1 in the retail price of Pocahontas coal, bringing the price down to \$8. There has been a slump in the Kansas-Oklahoma territory following the best mid-winter season for several years. The mines are now operating on a three- to four-day weekly basis instead of full time. There has been a let-up in the Ohio steam trade. Consumers are using their surplus supplies and the utilities are practically out of the market.

The clearing of the atmosphere as regards a strike or suspension in the soft-coal fields had its effect on the Pittsburgh market. Coal has become more difficult to sell and some consumers have practically retired from the market. Demand at Boston and throughout New England continues quiet. There have been no market developments. Spot buying is slow and there is not much doing in the contracting phase of the industry. Similar conditions exist along the Atlantic coast. Large reserves preclude the placing of new orders and the prospects are not bright.

Output of soft coal took a slight drop during the week ended Feb. 16, according to the Geological Survey, declining to 11,157,000 net tons, a decrease of 344,000 tons when compared with the previous week, while the output of hard coal dropped to 1,900,000 net tons, a



Estimates of Production

(Net Tons)		
BITUMINOUS		
	1922-1923	1923-1924
Feb. 2.....	10,686,000	11,337,000
Feb. 9 (a).....	10,725,000	11,501,000
Feb. 16 (b).....	10,431,000	11,157,000
Daily average.....	1,739,000	1,859,000
Coal year.....	364,418,000	482,413,000
Daily av. coal year.....	1,348,000	1,793,000
ANTHRACITE		
Feb. 2.....	2,056,000	1,893,000
Feb. 9 (a).....	2,023,000	1,906,000
Feb. 16 (b).....	1,828,000	1,900,000
Coal year.....	44,300,000	81,970,000
COKE		
Feb. 9.....	359,000	286,000
Feb. 16.....	378,000	293,000
Calendar year.....	2,337,000	1,821,000

(a) Revised from last report. (b) Subject to revision.

decline of but 6,000 tons when compared with the week of Feb. 9. The production of soft coal during the first 269 days of the present coal year has been 482,413,000 net tons, as compared with 364,418,000 net tons during the corresponding period of the coal year 1922-1923.

Cold weather and the heaviest storms of the present winter have speeded up consumption of anthracite. Transportation has not been hindered and both wholesale and retail dealers had sufficient coal on hand to take care of the increased demand.

The settlement of the British dock strike has cleared the dark clouds hovering over England and has blocked the hopes of American exporters who expected to ship considerable coal abroad. The local export situation is without special features. There is plenty of coal at Hampton Roads to meet all requirements. A little more activity is noted at Baltimore. Dumpings at Hampton Roads during the week ended Feb. 21 were 360,491 net tons, a decrease of 34,973 tons when compared with the previous week.

Midwest Business Sags

There was no heart in the Midwest coal trade during the past week. Nobody is buying much and nothing is in demand. Cold weather stimulated some trade in domestic lump at a little less than the circular prices, but other domestic sizes dragged and screenings business just barely absorbed the volume of fine coal available. Franklin County lump is on its way down from \$3.75 and the middle sizes are passing \$3 downward bound. Screenings stick at \$1.90@\$2 and may rise with the inevitable drop in production generally. Central Illinois lump is \$3, with screenings unchanged from last week. Eastern coals are weakening on the Chicago market. Pocahontas lump can hardly command the top price of \$3.75 and mine-run is softening at \$2.50. Good eastern Kentucky lump tends downward from \$3.25.

All Illinois mines had plenty of "no bills" of all sizes, excepting screenings, and these "no bills" kept some mines from working this week. If it had not been for the cold weather mining would have been at a standstill in the Carterville field. Railroad tonnage is reported light and mines working are getting from two to three days a week, the latter where railroad contracts are included.

The Association operators are holding pretty well to-

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

Table with columns for Market Quoted, dates (Feb. 26, Feb. 11, Feb. 18, Feb. 25), and coal types (Low-Volatile, Eastern; Midwest; South and Southwest). Includes various grades like Smokeless lump, Franklin, Ill. lump, etc.

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

Table with columns for Market Quoted, Freight Rates, and dates (Feb. 26, 1923; Feb. 18, 1924; Feb. 25, 1924). Lists prices for Broken, Egg, Stove, Chestnut, Range, Pea, Buckwheat, Rice, Barley, and Birdseye.

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics

Kentucky Lump and Steam Move

Another spell of cold weather is resulting in slightly better demand from retailers for Kentucky coal, coming at a time when the jobbers and operators were beginning to need additional business on prepared sizes, as steam demand has been quite good. Eastern Kentucky mines in many instances are busy and are sold up for a few days to come with the result that prices are fairly steady although it is asserted that the top price on prime block coal has slumped from \$3.75 to \$3.50. Eastern Kentucky has been moving good tonnage into various districts and has been maintaining prices well.

With the signing of the wage agreement at Jacksonville, Fla., last week, Kentucky operators have lost the last chance for the expected general strike, which would have meant big business and good prices to the non-union fields of Kentucky. However, the non-union fields are operating largely on the 1917 wage scale and are steadily underselling union fields, with the result that if there is much business in the spring and early summer they should get a fair share of it.

With the exception of slightly weaker screenings in western Kentucky the market shows no change over the week. Pea, slack and fine screenings are offered at from 90c. to \$1 as against \$1@1.10 as the minimum a week ago. General movement is fair and a full car supply is reported. However, the outlook is for a slow and draggy spring. Many of the operators working under a no-strike contract which has a year yet to run, had been entertaining strong hopes of a national strike this year. One section of the field has a contract expiring on March 31, and there is some question as to whether or not this will be renewed.

Northwest Prices Sinking

The feature of the Duluth market this week is a cut in the price of Pocahontas. One dollar has been lopped off the price, making lump \$8. Run of mine remains the same at \$6.50 and screenings are off 25c. to \$5.25. All other bituminous and anthracite coals are the same. Consumers are holding off again, and trade is considered dull. There is about 2,225,000 tons of free coal on docks at Duluth-Superior. This amount is not excessive, and will be fairly well cleared up by the opening of navigation, unless the construction of territory caused by the "unfair" freight rates causes unusual loss in distribution.

The Milwaukee coal market continues on an even and satisfactory basis. The local demand is brisk because of harsh and stormy weather. Country transportation conditions are nearly normal again and orders are being filled more promptly. There have been no important changes in prices at Milwaukee.

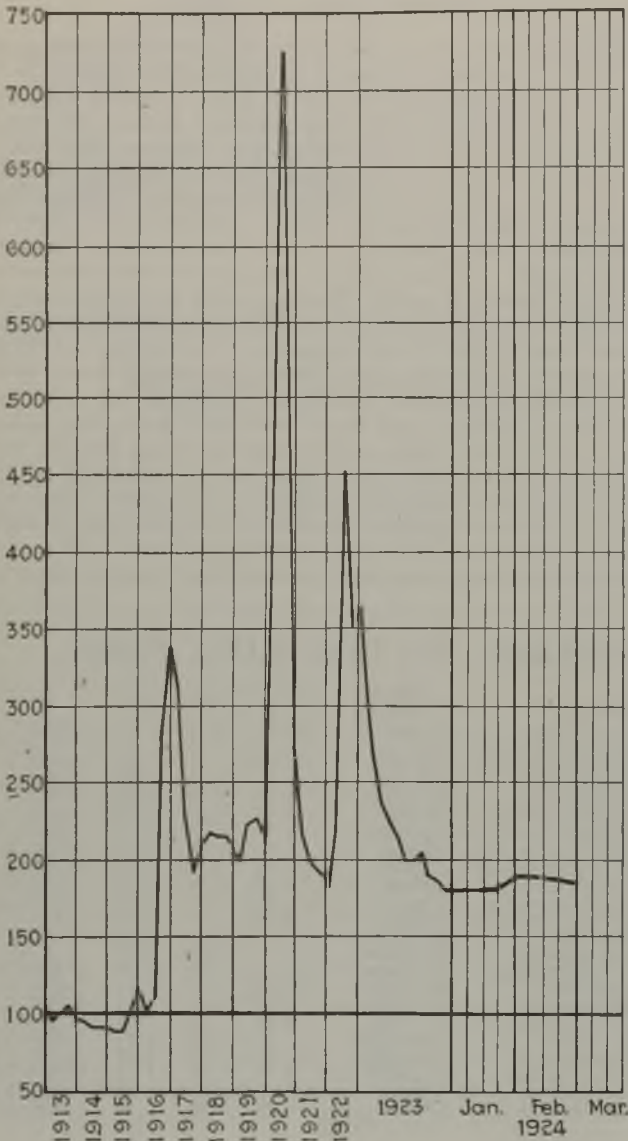
Western Trade Slumps

A slump has started in the Kansas-Oklahoma territory following the best midwinter season for several years. Operators report their mines working from three to four days a week, whereas they were working full time. A surplus of all grades had begun to accumulate last week. The surplus of screenings remains little changed this week, but there has been an increase in the surplus of nut and lump. A resumption of price shading further reflects the changing conditions. Folder prices are unchanged, however. Kansas lump is quoted at \$5; nut at \$4.25; mine run at \$3.50 and screenings at \$2.25.

In Colorado the resumption of warm weather has again caused a marked decline in the production and marketing of coal. Mines worked on an average of thirty-one hours for the past week. The operators' weekly reports show that 26 per cent of the full working time was lost on account of no market.

Prices remain unchanged. The transportation and car situation has been favorable except in Routt County, where the mines are experiencing considerable car shortage.

Prices have been shot to pieces in Utah. Operators are cutting 50 to 70c. a ton from mine quotations and dealers' prices have cut from 50c. to \$1.50. The change is on prepared sizes only. Mine prices have been as follows: Lump, \$4.50; domestic lump, \$3.75; stove, \$3.75; nut, \$3.50; mine-run, \$3.50; screen slack, \$1.75; straight slack, \$1.25. A new price circular is expected soon. One cause for the



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

Index	1924		1923	
	Feb. 25	Feb. 18	Feb. 11	Feb. 26
Weighted average price	\$2.23	\$2.25	\$2.27	\$3.49

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally, shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

gether, with one or two cutting prices to the level of the independents. The Association prices are \$3.75 for lump, \$3.50 for egg and \$3.25 for nut, in the country. The independents are selling lump at \$3@3.25, egg \$2.75@3 and nut \$2.50@2.75. Some of the Standard operators are doing as well on sizes as the independents in the Carterville field.

The Mt. Olive situation is considerably improved. There has been a good demand for domestic and the steam is taking care of nut and screenings. Mines work four to five days. In the Standard district conditions have been bad, but are showing up better under the temporary demand, though prices have not improved.

St. Louis Demand Is Fair

Retailers report business in St. Louis fairly good on cheaper and middle grades of coal. A little activity on high-grade coal is seen in isolated spots. Demand is light for smokeless, anthracite and coke. Wagonload steam shows improvement, while the demand for carload steam locally has been somewhat better, especially for screenings. Country domestic is responding to the cold wave, for cheaper grades principally. Dealers are carrying small stocks. Country steam is not a factor and is seldom heard from. There are no changes in retail prices.

cut is the fact that three more mutual concerns are trying to get started at Salt Lake City. They have been undercutting the trade 50c. a ton. However, the market is low all around.

Buyers Disappear from Ohio Markets

Buyers in the Ohio markets have practically disappeared since the signing of the Jacksonville agreement. Prices have dropped and the market is extremely quiet. Car movement into the southeastern Kentucky, Big Sandy, Logan County and Kanawha fields, according to reports from Cincinnati, is steadily increasing and most of the mines are reporting about four days a week. Inquiry from Michigan points has slackened. The smokeless operators have been keeping close watch on the British and the French situation. Some contract business is being talked of. Specialized coals are quoted as follows: Egg, \$3@3.25; lump, \$3.75@4.

Operators and brokers in the Cleveland market experienced a decline in business last week. Spot prices show a tendency to weaken but it is not felt that they will go much lower. Since the early part of last week curtailment has been necessary in many operations and production has been considerably cut. The eastern Ohio No. 8 field during the week ended Feb. 16 produced 362,000 tons of coal, or about 52 per cent of potential capacity, which is estimated at about 700,000 tons.

In and around Columbus there was a let-up in the steam-coal trade and large users are scarcely buying current needs. Utilities are temporarily out of the market, while some of the large users of screenings are out of the market because of coal-pile fires. Consumption is about normal, especially in iron and steel industries, while railroad demand is not quite as strong as formerly. Demand for domestic consumption is a weather proposition with a seasonal demand reported from all sections of the state. Dealers are not disposed to accumulate stocks and are buying on a hand-to-mouth basis.

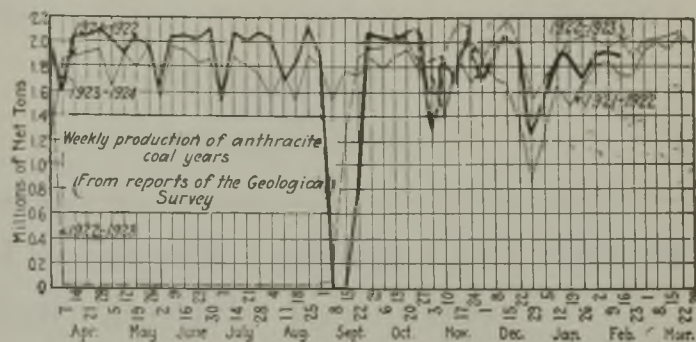
There is absolutely no change in price of coal in the Pittsburgh district or adjacent districts that can be traced to the wage settlement. Sellers have found the market very dull since the settlement, but they had found it practically as dull for a short time before. Consumption of coal is at a high rate. The steel mills are running well and railroad operations are running heavier than in December. Domestic consumption is good, and mine operations in the past few weeks in the district have averaged about 55 per cent.

Since the Jacksonville adjustment forecasts what will be done at a joint conference to be held at Altoona next month, operators in central Pennsylvania are making offers and many inquiries are being received, so that there is little doubt but that the basis for signing up for contract coal can be readily reached.

Trade at Buffalo is quiet notwithstanding heavy snowfalls and stormy weather. There is little activity.

Dull Outlook in New England

The settlement at Jacksonville relieves the last lingering worry of any New England buyers, and doubtless we are in for a long period of dullness. There is little spot buying in any direction, and no consumer with stocks sixty to ninety days ahead can be roused to any immediate interest in the price of coal. Receipts all-rail and by water are about on the average of the past six months, and no marked



increase or decrease is looked for in the near future. Quotas on contract are being accepted reasonably well, but as most of the latter are on a monthly basis, subject to occasional price revision, there is no special significance in the moderate volume coming forward.

Hampton Roads quotations are for the most part unchanged, \$4.75 per gross ton f.o.b. vessel being the asking price of most of the agencies, although there are some who say they are netting \$2.35 and upward per gross ton at the mines for Western business. Likewise there are shippers who are frankly selling for less than \$4.75 at Newport News and Norfolk to move demurrage coal. It is evident that effort will be made to sign up buyers on the \$4.75 basis, a figure that on the 1917 wage scale gives the producer a small margin, but it remains to be seen how nearly stable the market can be made for Navy standard grades.

Pocahontas and New River certainly have the call in practically all the territory here within 100 miles of tide-water. While certain of the factors rehandling coal from cargoes for inland distribution are trying to go through the motions of placing coal at \$6.50 per gross ton on cars Boston or Providence, it is clear that the only actual sales are by those interests willing to accept \$6 as a maximum.

From central Pennsylvania there is only a small tonnage being received by rail and water. The Philadelphia piers show a pronounced slump in the volume dumped for New England, and the New York piers have suffered a similar falling off in business. Except in remote places where Pennsylvania coal can be sold at a moderate freight rate in comparison with market rates from Hampton Roads there are only restricted openings for coal mined on the terms of the union contract.

Activity Lacking in Seaboard Markets

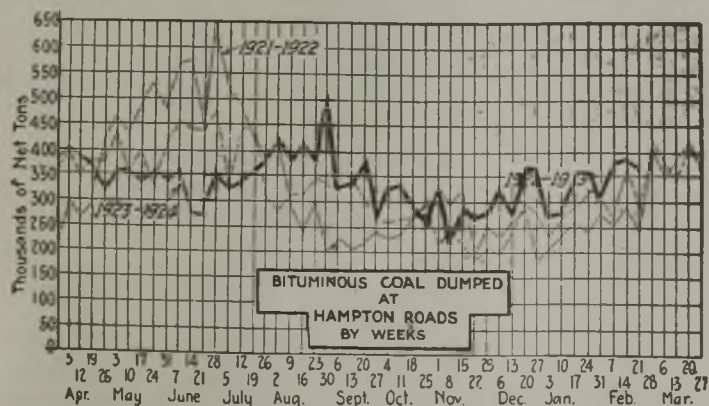
The soft-coal trade along the Atlantic seaboard from New York to Baltimore shows little activity. There are no immediate indications of betterment and buyers are not in the market for heavy tonnages, although there is no surplus of free coals. Contract coal is moving in good volume. At New York receipts at the railroad terminals increased over the holidays but this was to be expected. The prices have not changed materially.

Anthracite Market on Even Basis

The cold weather has kept the anthracite market on an even basis. Demand is regular and wholesale as well as retail dealers are able to keep their stocks moving. Demand, of course, centers around stove and chestnut, but production is more than sufficient to keep consumers supplied. Some of the companies, it is asserted, are storing pea coal. The steam sizes are moving in good volume. Demand for barley is the strongest and some of the independent product of this size is quoted at more than the company schedule of \$1.50.

Car Loadings, Surpluses and Shortages

	Car Loaded		Car Shortage
	All Cars	Coal Cars	
Week ended Feb. 9, 1924	906,489	199,791	
Previous week	929,936	198,955	
Same week in 1923	849,352	190,990	
	Surplus Cars		Car Shortage
	All Cars	Coal Cars	
Feb. 7, 1924	138,017	53,758	6,998
Same date in 1923	28,628	7,438	
Jan. 31, 1924	169,036	67,578	4,958



Foreign Market And Export News

British Coal Market Breathes Easier with Settlement of Dock Strike

Fear that the British coal market would be seriously hampered by the dock workers' strike were quickly dissipated with the announcement that an agreement had been reached, although the men did not return to work immediately. The terms are regarded as a concession to the demands of the men, but they are heartily approved, as they averted what threatened to be a serious labor difficulty.

Output of British coal during the week ended Feb. 9 was 5,804,000 tons, according to a cable to *Coal Age*, as compared with 5,245,000 tons the previous week, or an increase of more than 500,000 tons. The output for the corresponding week of 1923 was 5,567,000 tons.

Exporting of Welsh coals continued uninterrupted, notwithstanding the labor trouble. Demand from foreign buyers was good. Mine owners are looking forward to contract making. Prompt shipments also are reported as easier.

Unfilled orders carried over from January, the threat of a transport strike, and the accumulation of new orders held up by the recent rail strike combine to create a very firm tone. Practically without exception collieries are substantially booked for the next two or three weeks. The demand for early coal is pressing. Inquiry from Europe, Italy and South America is strong. There is little business with Germany but a good demand from the Near East.

Unable to carry out their present commitments, operators are reluctant to accept new business, and in many cases will not take orders for delivery before March. It will be impossible to keep the collieries working fully under the prevailing conditions.

The prospects at Newcastle for February are bright, and all sections enjoy a good demand.

French Coal Market Steady; Demand Fairly Active

The French coal market continues steady. Demand is fairly active and there is a good supply of coal being furnished to Belgium by the Nord and Pas de Calais collieries. The reduction of 3 fr. requested by the government authorities in the prices of all coals effective Feb. 1 widened the range in the selling prices of French and the various foreign coals. Some inconvenience to sellers and buyers has resulted from the recent imposition of restrictions on exports by the government officials, and miners' delegates have been in conference with the Belgian authorities regarding the new rules.

Inquiry for British coals has been dull and the congestion at the British docks had little if any effect on France.

During the first 29 days of January the S.C.O.F. received through Az Ehrang and Aix la Chapelle 246,777 tons of coke. The Société des Cokes de Hauts-Fourneaux, which had charge of the reparation fuels, dissolved on Jan. 31, and its successor is in course of organization. It is expected the new price for coke will be 143.5 fr. delivered on the frontier. Deliveries of coke from the Ruhr at present amount to about one-third of the requirements of the French metallurgical industry, making additional purchases necessary from either the French collieries or from British, Belgian or Dutch cokeries.

More Activity at Hampton Roads

Considerable activity in coastwise and foreign movement was reported at Hampton Roads last week, with consequent diminishing supplies at tidewater. Bunker trade was reported fair, but prices continued at a low level, being strengthened but slightly by increased trade.

Inquiries from Italy and South America were reported on an increase, and the prospect for foreign business was brighter than for several previous weeks. Prices at tidewater were proving attractive to foreign shippers, and several good orders were said to have been booked recently.

The tone of the market was somewhat stronger, and there was an indication that trade would improve in the near future. Shippers were optimistic over business during March and April, with prospects of a number of good contracts April 1.

Export Clearances, Week Ended Feb. 23, 1924.

FROM BALTIMORE		Tons
For Chile		
Br. SS. Wearbridge.....		5,474
For Italy		
Ital. SS. Premuda.....		6,446
For Porto Rico		
Amer. SS. Millinocket.....		3,505
For Peru		
Jap. SS. Norway Maru (Coke).....		5,025
FROM HAMPTON ROADS		
For Canada		
Amer. Schr. Orleans, for Hamilton.....		999
Dan. SS. Bornholm, for Halifax.....		1,200
Br. SS. Rose Castle, for Halifax.....		6,951
Nor. SS. Jan, for Halifax.....		1,411
For France		
Nor. SS. Annavore, for Fort de France.....		4,851
For Brazil		
Jap. SS. Chile Maru, for Rio de Janeiro.....		6,671
For Italy		
Ital. SS. Matanzas, for Cagliari.....		2,870
For Uruguay		
Br. SS. Magdala, for Montevideo.....		6,072
For West Indies		
Dan. SS. Nordhavet, for Barbados.....		4,703

Hampton Roads Pier Situation

	Feb. 14	Feb. 21
N. & W. piers, Lamberts Pt.:		
Cars on hand.....	1,018	847
Tons on hand.....	65,824	55,982
Tons dumped for week.....	181,046	151,875
Tonnage waiting.....	12,000	10,000
Virginian Ry. piers, Sewalls Pt.:		
Cars on hand.....	1,276	865
Tons on hand.....	85,450	58,450
Tons dumped for week.....	98,132	105,017
Tonnage waiting.....	21,260	33,877
C. & O. piers, Newport News:		
Cars on hand.....	1,274	1,460
Tons on hand.....	63,290	72,940
Tons dumped for week.....	73,915	64,975
Tonnage waiting.....	5,800	

Pier and Bunker Prices, Gross Tons

	PIERS	
	Feb. 16	Feb. 23†
Pool 9, New York.....	\$4.90@5.25	\$5.00@5.25
Pool 10, New York.....	4.75@ 5.00	4.75@ 5.00
Pool 11, New York.....	4.50@ 4.75	4.50@ 4.75
Pool 9, Philadelphia.....	4.90@ 5.20	4.90@ 5.20
Pool 10, Philadelphia.....	4.50@ 4.90	4.50@ 4.90
Pool 11, Philadelphia.....	4.25@ 4.60	4.25@ 4.60
Pool 1, Hamp. Roads.....	4.80@ 5.90	4.85@ 4.90
Pools 5-6-7 Hamp. Rds.....	4.35	4.25@ 4.55
Pool 2, Hamp. Roads.....	4.60@ 4.70	4.60@ 4.75

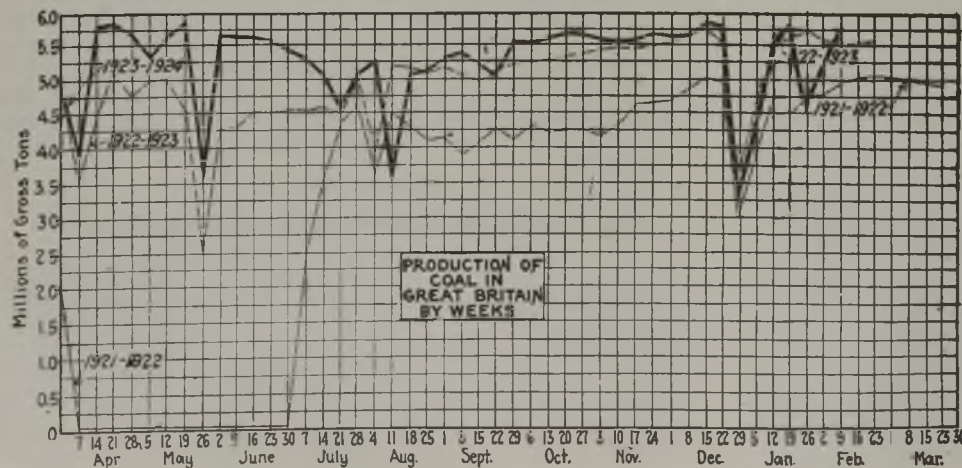
BUNKERS

Pool 9, New York.....	5.20@ 5.55	5.30@ 5.55
Pool 10, New York.....	5.05@ 5.30	5.05@ 5.30
Pool 11, New York.....	4.80@ 5.05	4.80@ 5.05
Pool 9, Philadelphia.....	5.15@ 5.55	5.15@ 5.55
Pool 10, Philadelphia.....	4.90@ 5.20	4.90@ 5.20
Pool 11, Philadelphia.....	4.65@ 4.90	4.65@ 5.10
Pool 1, Hamp. Roads.....	4.90	4.90
Pool 2, Hamp. Roads.....	4.70	4.75

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations by Cable to <i>Coal Age</i>		
Cardiff:	Feb. 16	Feb. 23†
Admiralty, large. 30s.6d. @ 31s.6d.		30s. @ 31s.
Steam smalls.	22s. @ 23s.	22s. 6d.
Newcastle:		
Best steams.	25s.6d. @ 26s.	24s.9d. @ 25s.6d.
Best gas.	25s.	25s.
Best bunkers.	25s. @ 26s.	23s.6d. @ 24s.

†Advances over previous week shown in heavy type, declines in italics.



Traffic News

Rate Change to Lake Ports Unlikely This Season

While the prospects favor an ultimate increase in the freight differential from the Southern coal fields to lower Lake ports, as compared with the rates from points of origin in the Pittsburgh and eastern Ohio regions to the same destinations, it is practically certain that no rate changes will be ordered in time to have a bearing on this year's Lake business.

The hearing before the Interstate Commerce Commission at which the testimony of the Pittsburgh and the Ohio operators was taken was concluded Feb. 21. The commission then gave the Southern operators and railroads a period of two months for the preparation of their cases. This unexpected delay in the progress of the case precludes any probability of a decision being handed down before the close of navigation next autumn. This calculation is based on the average time required for the consideration of a case of comparable intricacy.

Burden of Proof of Weight Loss Up to Consignee

In remanding the case for a new trial the Alabama Supreme Court recently held in the cause of James C. Davis, Director General, etc., vs. Samuel Zimmerman, appealed from the Mobile Circuit Court, that the transportation company could not be held liable for loss in weight of coal between shipping point and destination by reason of natural drainage and evaporation, and ruled that the burden of proof of loss other than from natural causes must be furnished by the consignee. The coal in question was shipped from Birmingham district mines to Zimmern at Mobile, Ala. The lower court awarded Zimmern \$2,136.40.

To Construct Lines in Illinois And Kentucky

After reargument, the Interstate Commerce Commission has affirmed the authority granted to the Southern Illinois & Kentucky R.R. to construct lines in Illinois and Kentucky to form, with existing facilities, a continuous line from Edgewood, Ill., to Fulton, Ky. The line is to be operated by the Illinois Central. The new line was justified largely because it gives a particularly favorable outlet for coal.

C. R. & E. Seeks Bond Issue To Improve Line

The Coal River & Eastern Ry. has asked the Interstate Commerce Commission for authority to issue \$500,000 in first mortgage bonds and \$1,000,000 in capital stock for the purpose of completing and improving its line. Of the total, \$550,000 is to be applied on

the purchase of equipment and increasing the weight of rail on the Laurel Creek line as may be required by mine development in that section. The Coal River Collieries is to receive the bonds and \$250,000 of the stock for the railroad property. The remainder of the stock is to be sold to individuals by the Brotherhood Investment Co.

Million Tons of Hard Coal Moved By Lehigh Valley in Month

The Lehigh Valley R.R. loaded 997,601 tons of anthracite during January, 1924, as compared with 1,190,564 tons in January, 1923, and 805,277 tons in the same month of 1922. It was stated at the offices of the company that a comparison with last year's figures is hardly indicative of conditions in that loadings in the winter of 1923 were exceptionally high following the settlement of the anthracite strike, the 1922 figures being more representative of an average month.

\$20,000,000 Cut-Off Again Is Approved

The Interstate Commerce Commission in Washington, on Feb. 16, for a second time approved action of the Illinois Central R.R. in its proposed plan to spend \$20,000,000 in a cut-off line of 169 miles from Fulton, Ky., to Edgewood, Ill., which will materially shorten the distance traversed in direct movement north from Kentucky and the South. The new line will open up a considerable amount of new territory for coal production it is said.

More Promotions on B. & O.

The following changes and promotions have been announced by the freight traffic department of the Baltimore & Ohio R.R. effective Feb. 15: J. L. Hayes is appointed assistant general freight agent, Baltimore, Md., vice George S. Harlan, promoted; R. J. Beggs, division freight agent, Cumberland, Md., is appointed assistant general freight agent, Baltimore, Md., vice H. G. Settle, promoted; C. M. Gosnell, division freight agent, New York, N. Y., is transferred to Baltimore as division freight agent, succeeding Mr. Hayes.

New Locomotives on C. & O.

The Chesapeake & Ohio has begun to put in commission some of its new locomotives, measuring 109 ft. over all, including tenders. These engines will be operated between Hunton and Clifton Forge. Twenty-five of the engines in all are to be delivered, having been built by the American Locomotive Co. at a cost of about \$100,000 each. Each locomotive develops simple tractive power of 103,500 lb., is equipped with 16 drivers measuring 57 in. in diameter and has a total weight of 565,000 lb.

Industrial Notes

The National Engineering Societies has inaugurated a policy calculated to insure the needed funds to provide a national employment service for engineers, with offices in leading cities throughout the country. Under this policy the Societies continue their financial support and this is supplemented by contributions from those deriving benefit from this enterprise, as no profit to anyone is to be taken; simply a self-supporting service. Contributions if on a basis of but 25 per cent of the fees which must be necessarily exacted by a commercial agency will make possible the realization of a national service. With the new plan fully developed representatives of the Employment Service will visit those with positions available to get first-hand information as to the requirements of the job. Over 55,000 engineers, including the most prominent of the profession, are members of the Societies conducting the service, thereby ensuring employers a selection from engineers of known antecedents and whose records have been closely scrutinized. Engineers seeking opportunities may arrange to obtain weekly by first-class mail the current list of openings. Their availability also is announced in the respective publications of the Engineering Societies.

Obituary

James Gorman, extensively interested in smokeless coal properties in low-volatile territory, died in Lynchburg, Va., Feb. 18. Mr. Gorman's death was entirely unexpected and the news of his demise was a distinct shock to associates and friends in the southern part of the state. He had for a number of years been associated with J. C. Sullivan in his operations and only recently at the annual meeting of the Smith Pocahontas Coal Co. was named as the head of that concern, operating at Caloric on the main line of the Virginian Ry.

John W. Trounce, vice-president of the Buffalo & Susquehanna Coal & Coke Co., in charge of sales, and vice-president of the Goodyear Lumber Co., died suddenly at his home in Toronto, Ont., Feb. 18, aged 50 years. His death was a great shock to associates in the coal trade, as he had been attending to business as usual in the week prior to his death. He was born at Port Perry, Ont., and as a young man settled in Buffalo, obtaining a position with the Goodyear lumber and coal interests, with which he was associated for thirty years. He had a large acquaintance and many friends in the Eastern states and in Canada.

William Donald Clark, well known in coal trade circles in the Fairmont region and construction engineer of the Domestic Coke Corporation of Fairmont, died of pneumonia at the home of his wife's mother at Fairmont during the second week of February. A son of Mr. and Mrs. George A. Clark, of Sidney, N. Y., and a graduate of Cornell University, Mr. Clark became connected with the Domestic Coke Corporation about five years ago. He married Miss Lucille Hart, of Fairmont, on Oct. 30, 1922, and is survived by her and by an infant son, William Donald, Jr. as well as by his parents and one brother, John A. Clark, an official of the Hope Gas Co., of Clarksburg.

Robert Gage, 77, one of the organizers of the Robert Gage Coal Co., of Bay City, Mich., and an owner of Michigan coal mines for years, died suddenly at his home in Jackson, Mich., Jan. 30.

Coming Meetings

Upper Potomac Coal Association. Annual meeting March 3, Cumberland, Md. Secretary, J. F. Palmer, Cumberland, Md.

Northwestern Pennsylvania Coal Operators' Association. Annual meeting March 4, Butler, Pa. Secretary, T. F. Diefenderfer, Butler, Pa.

Canadian Institute of Mining and Metallurgy. Annual meeting March 5-7, King Edward Hotel, Toronto, Ontario, Canada. Secretary, G. C. Mackenzie, Drummond Building, Montreal, Quebec, Canada.

New England Coal Dealers' Association. Annual meeting March 20-21, Boston, Mass. President, W. A. Clark, Boston, Mass.

News Items From Field and Trade

ALABAMA

Four convicts were burned to death in a fire which destroyed the prison at the Flat Top coal mines of the Sloss Sheffield Steel & Iron Co. on the night of Feb. 15. There were about 500 prisoners in the building at the time of the fire, all but four of whom were rescued and held in the prison walls. A number of other buildings in the enclosure also were burned, the total loss being over \$100,000, though no official figures have been given out. The convicts were under the care and supervision of the State Convict Board. It is announced by officials of the company that the building will be replaced as early as practical with a structure of modern design.

S. Y. Shelburne, well known in Birmingham wholesale and retail coal circles, suffered the loss of the larger part of his left forearm when he slipped and fell beside the railroad track in the yards of the Pan American Coal Co., of which he is president, when cars were being switched thereon, his arm and hand being so badly crushed under the car wheels as to render amputation necessary just below the elbow. Mr. Shelburne also is president of the Shelburne Sales Co.

It is announced that the mine of the Thomas Creek Coal Co., at Carbon Hill, Walker County, will soon resume operations. The operation has been idle for several months.

ALASKA

First actual demonstration of the value of Matanuska coal for coking purposes was made Feb. 2 when material produced in the ovens of the Alaska Railroad successfully smelted a charge of 4,800 lb. of scrap iron used in castings by the railroad. The coal came from Coal Creek. Chickaloon section of the Matanuska fields. It is pronounced by the foundry foreman as equal to any coke imported from eastern mines. The test finally solves the problem of smelting metalliferous ores, upon which had been pending negotiations for a smelting plant on the railroad.

ARKANSAS

Operation of the Western Coal & Mining Co.'s mine No. 6, near Denning, which had been idle since late in November, when the engine room was destroyed by fire, has been resumed. The hoisting engine was damaged beyond repair, necessitating the purchase of a new one. The mine employs approximately 75 miners.

The Fort Smith Spadra Coal Co., Fort Smith, with a capital of \$100,000, incorporated by W. D. Logue, W. G. Pendergrass and others will develop mines near Hartman, its present daily capacity being 600 tons.

COLORADO

During the month of January Colorado mines produced 1,209,152 tons of coal. This is an increase of 221,362 tons over the production for the same month last year. The average number of men employed in and about the mines was 13,896 and average number of days worked for the month was 20.2.

INDIANA

Dr. W. N. Logan, state geologist and head of the department of economic geology at Indiana University, has been honored with a fellowship in the Royal Society of Arts, of London, England. His selection is recognition of his work in the geological field of science and research.

The Enterprise Coal and Mining Co., of Sullivan, Ind., has filed certificate of final dissolution.

ILLINOIS

Big Creek Coals, Inc., in Mine No. 3 near Harrisburg, established a record for Saline County, Feb. 14, by mining, hoisting and placing into cars 4,187 tons of coal. The previous record for Saline County was 4,162

tons mined last year at the Harco mine. January production by the Big Creek company was the largest in the company's history, though only three of the six mines worked.

The Union Colliery Co., at its Kathleen mine near Dowell, on Feb. 15 paid the 800 men employed approximately \$95,000. The output of coal mined that fortnight, in thirteen working days, required 1,196 cars to transport it. The average of wages earned by all employees was \$123.19. The highest pay was \$194.45. Mike Maller, who led the list with 234 tons of coal, drew it.

KENTUCKY

The coal taxation bills on a tonnage basis which are now in the Kentucky General Assembly are in amounts of from 1 to 3 per cent of the sale price of the coal mined. The Nelson bill in the house was for 2½ per cent, but Mr. Nelson is willing to reduce this to 2 per cent. He figures last year's state production at about forty-three million tons, roughly valued at \$150,000,000 and figures that coal would produce about \$3,700,000 for the state in additional tax.

Fred M. Sackett, of the Byrne & Speed Coal Co., Louisville, who is affiliated with retail, jobbing and operating coal companies, has issued a statement refusing to seek nomination as U. S. Senator, but says that he would accept such an honor if tendered him by the Republican Party.

The Jones Brothers Coal Co., capital \$30,000, has been incorporated in Madisonville by F. P. Jones, T. H. Jones and others.

The Harlan-Jellico Coal Co. has been incorporated in Louisville by J. M. Dougherty, Dorothy Feil and others, with a capital of \$15,000.

The Reliance Coal & Coke Co., of Glomawr, is reported to have purchased the plant of the Defiance Coal & Coke Co., in Defiance, Ky.

The Lorena Coal Co. has been incorporated in Pineville, by D. E. Starbuck, W. R. Hughes and others.

The Willis-Harlan Coal Co., Hima, has increased its capital stock from \$40,000 to \$100,000.

MINNESOTA

The Duluth Chamber of Commerce has decided to fight the battle of the dock companies and throw the weight of its influence and the aid of its traffic department in the fight for adjustment of freight rates. At a meeting held at the Chamber the representatives of all dock companies presented their case and said that unless freight rates were changed it would mean the ruination of the companies. Plans already are under way for lessee shipments to the Head-of-the-Lakes next season.

The Superior Coal & Dock Co., is now drawn into the financial difficulties of its parent concern, the bankrupt Maynard Coal Co. The Emmons-Hawkins Hardware Co., of Huntington, W. Va., has petitioned the federal court at Duluth to administer the dock company's assets in Minnesota, complaining that the Maynard Coal Co. has failed to meet a promissory note for \$3,917 and declaring a majority of the dock company's stock is held by the Maynard Coal Co.

F. A. Wildes, State Superintendent of Mines, told the Minnesota Federation of Architectural and Engineering Societies at its annual convention held at Duluth a few weeks ago, that investigation of the fuel possibilities of the innumerable peat beds in Minnesota had reached a point "that we may confidently expect something important." Mr. Wildes spoke on "Development of Peat for Fuel Purposes." The price of this new fuel on the market, he said, must be so low that the coal operators cannot meet the competition. It will not be enough that this peat fuel can be sold for a few dollars under the present price of coal, but must be below the total actual cost of the coal without profits of any kind.

NEW JERSEY

An act has been passed by the State Senate of New Jersey providing that coal must be sold in units of 2,240 lb. to the ton instead of 2,000 lb. as at present. The bill now goes to the Assembly and then to the Governor for his action.

NEW MEXICO

The U. S. Land Office at Santa Fe has been directed by the Secretary of the Interior to offer for lease a tract of public coal land in New Mexico containing approximately 1,600 acres. The land is in the San Juan River coal field, about 12 miles northwest of Farmington. Lease for the tract will be at a government royalty of 10c. per ton for coal mined, a minimum investment in mining operations of \$100,000 during the first three years of the lease, and a minimum production of \$5,000 tons of coal a year beginning with the fourth year of the lease. Lease of this land will be offered at public auction to the highest bidder and the exact date of the offering will be announced at the Santa Fe land office.

NEW YORK

Alfred D. Thompson, who has been vice president of the Titan Fuel Corporation since its organization, has resigned to assume charge of sales of the Sullivan Pocahontas Coal Sales Co., of Charleston, W. Va. This company will handle the tonnage of the Sullivan Pocahontas Co., recently formed through the consolidation of other coal companies in West Virginia, having mines in the Virginian and C. & O. railways. Mr. Thompson was formerly connected with the Pennsylvania Coal & Coke Co. and during the war was assistant deputy commissioner of the Tidewater Coal Exchange New York City.

The Central Coal & Coke Co. report for 1923 show a net income of \$565,615, equal to \$9.20 a share on the \$5,125,000 common stock of \$100 par value outstanding, after interest and provision for the preferred dividends. This compares with net income of \$309,177, or \$4.20 a share earned in 1922. The net sales amounted to \$10,472,857 against \$7,473,700 for 1922, and the surplus for the year was \$164,365 against \$61,677. The balance sheet as of Dec. 31, 1923 shows total current assets of \$3,095,246 against \$3,089,443 last year, and total current liabilities of \$2,765,208 against \$1,009,921, making net working capital \$330,038 compared with \$2,079,522 at the close of 1922. The profit and loss surplus of \$12,676,828 compares with \$13,012,047 for the year previous.

OHIO

Lee Llewellyn, formerly with the Pittsburgh Coal Washer Co., and recognized as an expert on coal preparation has been appointed general manager in charge of sales of the Houston Coal Co., of Cincinnati. Mr. Llewellyn took his B.Sc. at the University of West Virginia in 1899 and a short time later went to Pittsburgh, where he was advanced to the place of directing the designing and manufacture of coal-preparing and cleaning plants for Heyl & Patterson. He remained there for seven years and then transferred the scene of his endeavors to Alabama, where he erected cleaning plants and was for a time in active direction of operations. He returned to Pittsburgh and entered the employ of the Pittsburgh Coal Washer Co. twelve years ago. Mr. Llewellyn succeeds to the position held by the late Kuper Hood. Harry Olmstead, who has been director affairs since last fall, will become Mr. Llewellyn's assistant.

W. D. McKinney, secretary of the Southern Ohio Coal Exchange, Columbus, has been spending considerable time in Washington, D. C., appearing for that organization in the lake freight rate controversy before the I. C. C. In the complaint of the western Pennsylvania and the eastern Ohio operators asking for a revision of freight rates on lake coal, Mr. McKinney is taking a prominent part. The old question of the differential between the Ohio and the Inner Crescent fields is being revived.

C. A. Ilgenfritz has resigned as vice-president of the Stroh-Ilgenfritz Co. to become assistant purchasing agent for the Youngstown Sheet & Tube Co. Henry A. Butler will succeed Mr. Ilgenfritz as vice-president, and the name of the company will be changed to the Stroh-Butler Co. The directors, in addition to J. R. Stroh and Henry A. Butler, are: W. H. Wulf, W. E. Beadling and J. G. Butler Jr. The Stroh-Butler Co. will continue the business

of the old company, representing producers, and dealing in coal, coke, alloys, fluorspar, steel, firebrick, fireclay and fuel oil. The change is effective March 1.

OKLAHOMA

The business of coal mining does not come under the jurisdiction of the Oklahoma State Corporation Commission, according to a ruling made by the commission. Under this opinion the commission recently dismissed the case of the Oklahoma Farmers Union Exchange vs. the Cherokee Fuel Co., of Henryetta; Consolidated Fuel Co., of Muskogee; Starr Coal Co., of Henryetta; Montezuma Creek Coal Co., of Okmulgee; Midland Coal Co., of Oklahoma City; Southwest Coal Co., of Amarillo, Texas; Superior Coal Co., of McAlester; Edwards Coal Co., of McAlester; Huges Buttery Coal Co., of McAlester, and the McAlester-Collier Coal Co., of Muskogee. C. H. Hyde, as vice president of the exchange, charged that prices of coal at the mines were "unreasonable, excessive and extortionate."

PENNSYLVANIA

Nowhere in the United States is any industry observing the child labor laws more rigidly than in the anthracite regions of Pennsylvania. Dr. Royal Meeker, Secretary of Labor and Industry, said after looking over a report of an investigation into the child labor conditions in 100 collieries in Lackawanna, Luzerne and Schuylkill counties. He asserted that the child labor evil in the anthracite field is a myth and that reports of child welfare organizations claiming that thousands of children are being illegally employed in the hard-coal mines are without foundation. The investigation was made by M. P. Frederick, an inspector of the Department of Labor and Industry who reported that he found only five boys between 14 and 16 years of age employed and that they were working in the breakers and in accordance with the existing legal requirements. Several boys under the legal age were found working with forged age certificates.

Reorganization and refinancing of the Penelec Coal Corporation, the fuel-supplying subsidiary of the Penn Public Service Corporation, is attested by a mortgage recorded in Ebensburg, Cambria County, for \$1,500,000, covering all its properties. The mortgage is dated Feb. 1, 1924, and was given by the Penelec Coal Corporation, which has a Pennsylvania charter but which maintains its principal office in New York City, to the National Bank of Commerce of New York City. The mortgage names the Penn Public Service Corporation as a third party in the agreement, based on the fact that the corporation holds a number of leases on properties included. All underlying securities of the Penelec company are retired by this action. The company owns approximately 6,000 acres of coal lands in Cambria, Indiana, Somerset, Clearfield and Centre Counties.

S. D. Warriner, president of the Lehigh Coal & Navigation Co., in his report for 1923 says that notwithstanding the miners' strike and the general observance of holidays in the anthracite fields, the production of the company was high, being exceeded only in the war years of 1917 and 1918 when working hours were abnormally increased. The income account of the company for the year ended Dec. 1923, shows net income of \$3,473,507, after expenses, charges and taxes, being equivalent to \$5.94 a share on the 584,868 shares of capital stock, compared with net of 11,587,024, or \$2.71 a share on the capital stock in the preceding year.

Eighteen acres of ground purchased by the City of Johnstown for park purposes is underlaid with three veins of coal and the only available outlets conflict with mines of the Cambria Steel plant and the Valle Smokeless Coal Co. Mayor Louis Franke recommends the selling of the coal right to the highest bidder as it would not pay the city to undertake to develop the small tract with so many obstacles in the way.

Sale of the Johnetta Brick & Coal Co., of Johnetta, to the Pittsburgh Plate Glass Company for a cash consideration of \$500,000 has been announced by J. E. Stewart, president of the Johnetta company. Included in the sale was a brick and tile plant employing 400 men and 4,200 acres of coal land.

Shelby D. Dimmick, vice-president of the Glen Alden Coal Co., Scranton, recently was elected president of the Engineers' Society of Northeastern Pennsylvania.

The Franklin Coke Co. at Tippecanoe, Fayette County, is preparing to resume

operations shipping coal after being idle for several months.

The United States Steel Corporation paid nearly \$1,500,000 to its pensioners during 1923, according to the report of the Carnegie Pension Fund. The total showed an increase of more than \$180,000 over 1922. Among pensions paid employees of the different companies were Carnegie Steel Co., Pittsburgh, \$367,469; American Steel & Wire, \$261,263; American Sheet & Tin Plate, \$196,223; National Tube, \$143,031, and H. C. Frick Coke, \$103,838. Since the fund was organized in 1911 \$9,543,235 has been paid in pensions.

UTAH

Articles of incorporation are being filed by the Consumers' Mutual Coal Co. The company will develop lands in Gordon Creek, Carbon County. Headquarters will be at Price. It is stated that the company has valuable properties which it hopes to develop to an ultimate capacity of 2,000 tons a day. The concern will be conducted along mutual lines. Organizers include Donald E. Jenkins, described as a Cincinnati and Salt Lake City capitalist, president; Arthur E. Gibson of Price, vice-president and general manager; J. Tracey Wootton, Salt Lake City attorney, secretary, and others. The treasurer is an assistant cashier of a big Salt Lake City bank.

Coal mined in Utah during January amounted to 529,570 tons compared with 468,735 for the same month last year. It was the best January output since 1920, when 589,668 tons was mined.

VIRGINIA

The New England Fuel & Transportation Co., which recently took over the Crowell & Thurlow vessels, has been reorganized as the Mystic Steamship Co., with J. R. Spear as its representative. The company is affiliated with the New England Coal & Coke Co., of which Mr. Spear also is the Norfolk representative.

The Amherst Fuel Co., of Huntington, W. Va., is contemplating locating an agency in Norfolk, but the details of the transaction have not been made public.

WASHINGTON

Coal operations may soon start on the island of Sucia, off the north of Washington coast. A government permit to prospect has been granted Henry W. Parrott, of Seattle. The island, which rises about 150 ft. at its maximum, is known to be underlaid by two coal seams, the Douglas, about 100 ft. below sea level, and the Newcastle, 200 ft. below sea level.

N. D. Moore, vice-president of the Pacific Coast Coal Co., has been elected president of the Federated Industries of Washington.

The American By-Products Corporation has filed articles of incorporation at Olympia, with a stated capital of \$2,000,000. Offices have been opened at Vancouver, with Henry C. Prudhomme in charge as secretary and general manager. Mr. Prudhomme announced that the new corporation takes over all the interests and assets of the Chemical By-Product Industries, including full ownership of all American and foreign rights to the Gordon Multiple Unit Retort and process for the recovery of oils, chemicals, drugs and other by-products from coal, lignite, oil shale, sawdust and waste wood.

WEST VIRGINIA

An injunction, the outcome of which may have an important bearing on the methods utilized in the mining of coal in West Virginia as well as in other states, is sought by the Chaplin Collieries Co. in the Circuit Court of Monongalia County to restrain the Pursglove Coal Co. from mining Pittsburgh coal underlying Sewickley coal owned by the plaintiff "in such a manner and in such a way as to unnecessarily injure the plaintiff and destroy its mine and endanger the lives of its employees," and to require the defendant to provide such supports as will protect the plaintiff in its property rights. According to parties to the suit there will be an appeal to the Supreme Court of West Virginia and perhaps to the Supreme Court of the United States without regard to the decision reached by the Circuit Court of Monongalia County. The importance of the suit lies in the fact that it will establish a rule, according to coal men, governing the mining of millions of tons of coal in West Virginia and that tracts under which there are more than one seam might be affected.

Union coal miners of southern West Virginia have formed the Pax Mining Co., capitalized at \$1,000,000 and with offices in the Boyce Building, at Charleston. The company will operate on an acreage adjacent to Grippe, on Coal River, its holdings adjoining the properties of the Brotherhood of Locomotive Engineers. Fifty-one per cent of the stock is to be owned and controlled by union miners but other union crafts or card men are to be permitted to buy stock. The president of the company is Otis Lively and its secretary and treasurer is P. R. Cameron. The company is now operating through one opening but plans twelve more openings and expects to reach a production of 2,500 tons a day within the year. Coal to be mined is in the No. 2 gas and the Big Eagle seams.

W. E. Wheeler, of the Wheeler Coal Co., of Columbus, Ohio, was in Charleston recently looking over several mines and has signed agreements to handle the output of the Big Bottom Coal Co., the Betty Ann Colliery Co. and the Lemoyne Coal Co., mines which have a daily average output of 15 cars.

J. C. Baker, of Beckley, W. Va., one of the pioneer mine managers of the Winding Gulf district, has become identified with the Newport News Coal Exchange as a field representative in the New River field. Mr. Baker will have his headquarters at Beckley.

R. R. McFall, treasurer and general manager of the Southern Fuel Co., of Morgantown, has relinquished the management of that company to become vice-president and general manager of the Universal Fuel Co., of Pittsburgh, of which H. J. Booth is president and William Booth secretary. This company operates the Riverseam Coal Co. at Hildebrand in Monongalia County.

Coal is again being shipped by the Coe-Pocahontas Coal Co., operating at Garwood in the vicinity of Clarks Gap on the Virginian Ry. The tract where the company is operating is just undergoing development and preparations are being made to erect a tiple of modern design. Among those largely interested in the Coe-Pocahontas Coal Company are the McQuails.

Six new tipples are to be erected on the properties of the Fordson Coal Co. on the Norfolk & Western Ry. in the Tug River district. The understanding is that five of the new tipples are to be constructed on the Pond Creek properties and one at Twin Branch. They are to be of steel and fully equipped with machinery for the proper preparation of coal.

The Elm Grove Mining Co., of Pittsburgh, operating in Ohio County, W. Va., has been authorized to increase its capital stock from \$2,400,000 to \$3,000,000.

CANADA

Over two million tons of Alberta coal was sold to Canadian points outside the province and the United States during 1923, states the annual report of the provincial mines branch. The total production of coal for the year was 6,866,924 tons, of which 1,382,788 tons was disposed of for consumption in Alberta, 1,937,753 for other provinces, and 83,557 tons in the United States. To the railway companies 3,110,121 tons was sold. The total production for the Alberta mines during 1923 was 890,491 tons over the total for 1922.

The announcement that Vancouver Harbour Commissioners propose the construction of coal bunkers at the Port of Vancouver to give the collieries of the Province of Alberta an opportunity to compete for the Pacific Coast mercantile business has stirred the coal operators of Alberta with enthusiasm and roused some manifestations of bitterness among the coal men of Vancouver Island. The managements of northern Alberta collieries already are organizing so as to be in a position to take full advantage of the new outlet when the time comes. Meanwhile William Sloan, Minister of Mines, and the representatives in the Provincial Legislature of the City of Nanaimo have obtained from the Harbor Commissioners the assurance that the bunkers to be built are not intended for the sole use of Alberta coals but will be open also to handle the coals of the island and other parts of the province. An interesting sidelight on the situation developed when the Home Products Association of Vancouver asked the Nanaimo Board of Trade to indorse the principle of the consumption of home products in preference to those imported. The Nanaimo organization wanted to know where the Vancouver association stood in the matter of encouragement of outside competition with locally produced coal.

New Equipment

Approved Single-Stage Fire Pump

Centrifugal pumps have been used for fire-protection purposes for many years and until recently those recommended by the underwriters were of 500, 750, 1,000 and 1,500 gallons per

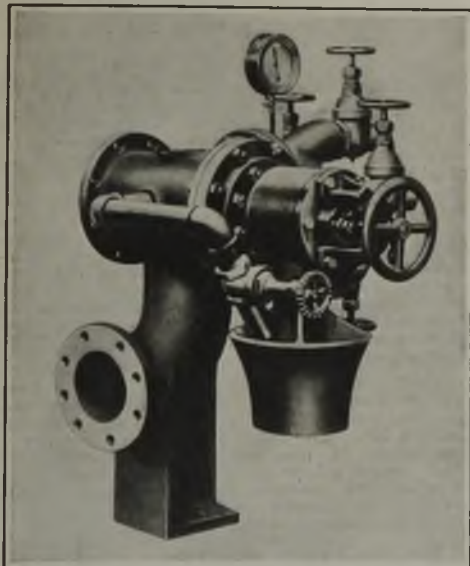


Fig. 1—Fittings for Centrifugal-Type Fire Pump

For control and test of the fire lines a set of fittings such as shown here is highly necessary. Pressure gages show the pressure required to deliver different volumes of water through the various fire lines.

minute capacity suitable for operation at a pressure of 100 lb. gage. Originally these pumps were made in the multistage type and ran at 1,150 r.p.m.; later the specifications were changed to permit the use of multistage 1,800-

r.p.m. pumps, and recently the specifications have been changed to permit the use of single-stage pumps.

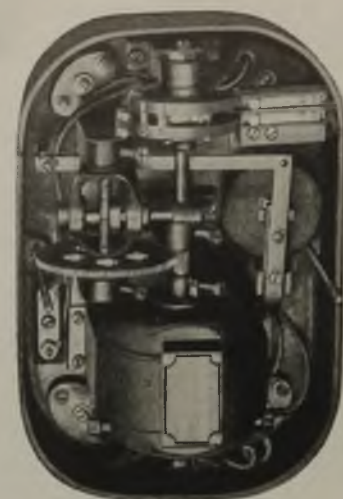
In line with these changes the Allis-Chalmers Mfg. Co. is now building a single-stage fire pump in accordance with the above specifications. The new pump is a development of one of this company's popular single-stage pumps which it is claimed has operated successfully against heads as high as 300 ft.

Auxiliary Relay for Long Time-Limit Service

For the purpose of controlling switching operations, mechanical operations and processes where a long time limit is desired, a relay, known as the type GK auxiliary relay, has been developed by the Westinghouse Electric & Mfg. Co. Extensive use has been made of this relay in automatic substations where various operations must be timed.

The relay is distinctive in that it is self contained and is so enclosed in a dust-proof case that it can be mounted wherever desired. The timing is accurate, yet the device is designed so that it can be adjusted by any careful workman. The possible time limit adjustments range from a maximum of 40 minutes to a minimum of 3 minutes.

The operation is effected by a train of gears and worms driven by a standard fan-type motor. The last shaft in the train which carries the contacts is operated by a worm which is so arranged that it is normally disengaged by a spring. This worm is mounted on a trunnion and is connected to a small electro-magnet which when energized will engage the worm with the gear.



Long Time-Limit Relay

This relay is arranged for time delays varying from 3 minutes to 40 minutes.

This coil usually is connected in parallel with the motor winding so that as soon as the relay is energized the motor is started and the coil energized. The worm then engages and the contact starts to move.

Healing Mule Collar

The Thomson Co., of Fitchburg, Mass., has just announced a new and improved zinc mule collar for mine mules. The hook formerly at the top is not needed in mine service and therefore has been eliminated. A guard has been substituted at the top, so that the collar will be perfectly smooth and prevent catching in mine timbers, ropes, guides, etc.

These collars are much lighter than the usual leather collars and being made of zinc form a zinc oxide protecting and healing surface which assists in the cure of any neck or shoulder sores with which the mule may be suffering. The collars are easily cleaned, thus rendering the collection of germs unlikely. Special springs cushion the shock when starting a load or when the car strikes an obstruction.

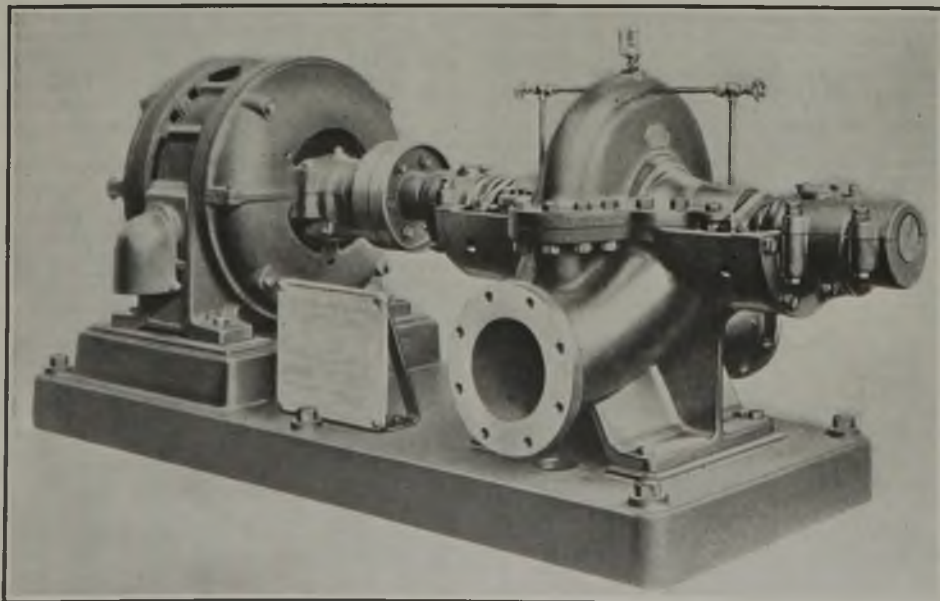


Fig. 2—Single-Stage Fire Pump

Due to the heavy construction of this pump it has been possible to operate it safely on heads ranging as high as 300 ft. The company has been very successful in the manufacture of pumping units because the complete outfit, including the motor, is made in the one factory, thus insuring perfect design and alignment.



Improved Zinc Collar

For mine mules this collar has been made as plain as possible so as to prevent catching into any obstructions along the road.