

COAL AGE

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Why Mining Industry Should Lead in Fire Protection

AS ONE EXAMINES the pictures of European mine villages and plants one is struck by the use in both classes of construction of fire-resistant materials. Can it be that the American mining plant is missing a good opportunity in its use of materials of low first cost but of great impermanence?

There are many reasons why mining plants should be better built than ordinary industrial undertakings. First there is the risk that a surface fire may be drawn into the mine by an intake current, the flames may set fire to the mine timbering and the smoke may asphyxiate the men underground. This is a likely danger where a wood breaker is placed over a shaft. The doors on such an opening can be closed or the fan may be reversed but delay in making these changes may result in disaster. The Union Pacific Coal Co. has put doors on a drift to prevent a surface fire from being sucked into the mine. However, when the intake air is cut off, the mine may become filled with methane, and even if reliance is placed on a reversal of the fan it may be done too late with unfortunate results. Besides the fan may not be able to overcome the natural draft of the conflagration. Fireproof construction will reduce these hazards considerably.

Another condition applies peculiarly to anthracite breakers. There are few wooden structures in any other industry than mining comparable in height with a mine breaker or so difficult to extinguish after a fire is started. Most anthracite companies realize that here is a danger for which they must be prepared. All those having wood breakers have already provided elaborate equipment for fire-fighting, but seldom does a wood breaker that catches fire fail to become a total loss.

As to villages and miscellaneous company buildings, they may be and often are surrounded by woods and brush and are liable to be burned down by fires occurring in forest, copse or field. Most companies clear the ground for 50 or 100 ft. back of all houses and shops, but the brush continually encroaches, tall grass grows and dies and the protection afforded by the bared space is lost. In some cases tenants erect small barns and readily combustible fences that form a connection like a train of powder from the forest to the nearby dwellings.

In all such towns, however, fire-fighting equipment is likely to be primitive. The United States Coal & Coke Co. has at Gary and Lynch modern and adequate equipment and good roads to make its movement prompt and its work effective, but too many mines have indifferent roads and nothing but a hose truck to be pulled by volunteers with which to fight fire—and some have neither hydrants nor a hose truck for the second is useless without the first. The only security—and it is but a small one—is that in mining towns there is definite grading

of authority, so that in all fire-fighting efforts there is almost sure to be someone recognized as entitled to take charge.

But with such conditions as exist the mining town needs as an insurance against fire to avoid the use of combustible building materials.

No Time for Strategy

INDUSTRIAL WARFARE again shadows the bituminous coal industry of the United States. Because operators and miners in the Central Competitive Field have been unable to agree upon a program which would assure existing wage standards for the workers and a fair competitive opportunity for their employers, hundreds of mines are idle and thousands of men are without employment. Except in western Pennsylvania, where there has been an open break with the United Mine Workers, stagnant endurance appears to be the accepted policy. Approach to constructive consideration is blocked by a jockeying for a favorable position in the public eye.

As the first move in the game of strategy to place the responsibility for the deadlock on the opposing party, the union has announced its readiness to enter into district negotiations with Central Competitive Field operators and its willingness to permit individual producers in that region to continue working, at the Jacksonville scale, pending the formulation of a new basic agreement. Outside of Ohio, where operators have countered with an invitation to the miners to join in the negotiation of wages which would place their mines "upon a continuously competitive basis," this gesture of the union has provoked no official rejoicings. On the contrary, Central Competitive Field producers as a whole are too unenthusiastic to make a formal reply.

These operators are frankly suspicious that the authorization to district union officials to enter negotiations "upon the basis of existing agreements" is merely a euphemism for instructions to union scale committees to insist upon the Jacksonville contract as the irreducible minimum in wages and working conditions. That this is the necessary interpretation, however, is denied by some whose opinions should command respect. Without a doubt the questioned phrase is susceptible enough of diverse construction to disturb the precisionists and grieve those who would brush aside technicalities to get at the heart of the problem.

Clearly this uncertainty as to the exact meaning of the offending phrase gives the union a tactical advantage which can be overcome only by forcing an official interpretation. But we are interested less in the strategy of war than in the possibilities of peace. Those possibilities are not brought nearer in an atmosphere of distrust. Until the union has indicated unmistakably to the contrary, it is only fair and politic to treat its

offer as one made in all good faith and sincerity. Certainly the best way in which to test that good faith and sincerity is to resume negotiations at an early date and to determine in actual conference just how broad or how limited the proposal for a full and free discussion really is.

Such an attack, it is realized, is not in accordance with the rules of the game as played by political strategists. But this is no time for old-fashioned maneuvering, for fencing with phrases while economic mistakes swell into catastrophe. To squander precious time upon phrase-mongering while delaying consideration of the vital issues is criminal extravagance. It promises nothing constructive for the industry. What is needed is not strategy, but open-mindedness and trust upon both sides—not worship of any set formula, but an honest determination to examine all the facts in an unprejudiced spirit and with a zeal to work impartial justice to the industry and to those dependent upon it either as consumers, employees, managers or investors.

A campaign in which everybody ultimately loses can hardly appeal strongly to industrial leaders in either camp. A struggle over wage rates while the larger issue of production costs is still untouched seems a sad waste of energy which might better be conserved for expenditure on the creation of sound labor relationships. Embattled legions bent upon Pyrrhic victory, however, are a sorry substitute for the partnership of the conference table.

A Pretty Mess

WHATEVER MAY BE BEST for the human stomach, boilers thrive best on distilled water, and companies, like the Gallup-American Coal Co. and the Chile Copper Co., which use a closed system in which the make-up water is first evaporated and then fed to the boilers, find it gives the best of results.

Though these two companies are mentioned as being well-known to mining men it must be remembered that the use of distilled water for boiler use is quite general. It has certain difficulties, however. Should the water become aerated, corrosion will occur in the absence of scale, which, however desirable in many ways in increasing the efficiency of the boiler and preventing overheating, removes from its surfaces a protection they would otherwise have.

Unfortunately some companies use steam for processing and accordingly waste so much water that the make-up burden is too heavy to be economically met by distilled water. It has been stated that there is no economy in this method of operation if over 20 per cent of the water in the system is make-up, but that must depend largely on the character of the water being used.

In the future, perhaps, boilers will become less and less dependent on the character of their water supply. They will use the same water over and over again. Perhaps before many years power plants will not trouble themselves much because the water in the rivers is acid.

So long as waters are used that are not distilled, the quality of the water becomes important, and until just recently it has been customary to say that sulphates with their scale-forming qualities were, always and everywhere, undesirable. When mine water laden with iron sulphates is added to river water it changes the carbonates which are "temporarily" hard into sulphates which are "permanently" hard and which form a hard scale in the boiler instead of a soft scale or sludge. For

these reasons the discharge of mine water into rivers was thought an uncompensated injury to industry.

But strange to say boiler experts are beginning to feel kindly toward sulphates, and are commencing to add them or sulphuric acid to certain kinds of water for the purpose of saving their boilers from destruction. They are talking of carbonate-sulphate ratios. If there is too much caustic carbonate, add some sulphate or some sulphuric acid and save the boilers from embrittlement by strain and sodium hydroxide.

The addition of sodium sulphate increases the total solids in the water but has the advantage over sulphuric acid that corrosion cannot result from its improper handling. However, the general practice is to use sulphuric acid, taking care not to use so much as to render the water acid. This changes some of the carbonates to sulphates and protects the boilers. The acid is fed to the water in the feed-water heater. An effort is made to keep the sulphate-to-carbonate ratio (with sodium hydrate estimated as carbonate) in the proportion of $3\frac{1}{2}$ to 1.

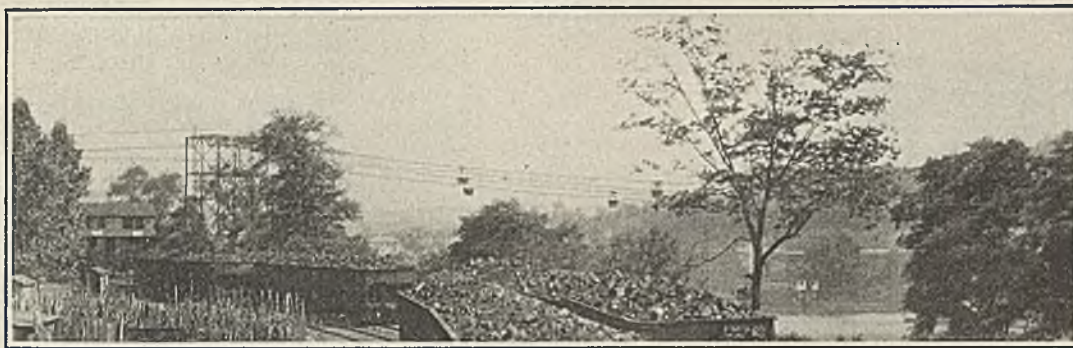
At Urbana, the University of Illinois is adding lime also to assure the neutralization of the added acid. Before the latter was applied three boiler drums had to be replaced after only five years of service, and now after ten years' operation on this treatment the boilers have been thoroughly inspected, test rivets have been removed and a close inspection made for signs of leaking or cracks around rivet holes. As a result the boiler inspector for the insurance company has declared the boilers to be in perfect condition.

A power plant in Champaign put some boilers into service in 1916 using the same water as the University of Illinois, but without the sulphuric and lime treatment, and in 1925, the boilers manifested embrittlement.

No one can deny that some of the waters of branch streams in the coal regions of Pennsylvania are so acid as to be unfit for boiler use. However, there is, perhaps, a compensation for those using the water of the big rivers of those regions in the fact that the sodium hydroxide cannot embrittle the boilers so long as there are enough sulphates to prevent that action. Embrittled boilers are reported at Belden, Big Foote Prairie, Bloomington, Urbana, Champaign, De Kalb, Hartland, Hoopeston, Paxton, Wateka, and Sycamore, all in Illinois; at Los Angeles, Cal.; Appleton, Wis.; Dallas, Houston and Waco, Tex.; Denver, Colo.; Auburn, Ind.; Lawton, Okla., and Buffalo, N. Y.

"Here's a pretty mess!" Boiler experts condemning the presence of mine effluent in river water to be used in boilers because of the presence of sulphates while other experts are adding sulphates and sulphuric acid to water for use in boilers! Health officials declaring that iron sulphates and iron hydroxide waters should be kept out of the rivers while others are adding iron sulphate and iron hydroxide for coagulation purposes! All of which shows that a proper proportion of mine water may not be harmful but beneficial, but how much? That is the problem. It is significant that the embrittlement is not reported in the regions where the waters are mixed with the effluent from mines.

It should be added that some authorities declare that boilers are not protected by sulphates and question the value of the technique of adding sulphuric acid to water. Moreover in the presence of organic matter, sulphates, it is conceded, cause foaming. So long, however, as the matter is unsettled, the coal men are justified in saying that it should not be determined in their disfavor.



Aerial Tramway Spanning River Opens Up Markets Unreached by Water Transportation

Buckets Carry Coal Over Long High Span at the Rate of 200 Tons per Hour—Railroad Cars and River Barges May Be Loaded at the Same Time—Mine Is no Longer Dependent on River Markets Alone

COAL is not always disposed of with the greatest facility or to the best advantage in markets served by carriers that offer the lowest freight rates. Thus, while transportation by river is generally considerably cheaper than by rail, the former means offers a potential market that is limited to customers and communities bordering the stream. Railroads on the other hand, lead to wide marketing fields. For this reason most commercial mines located on navigable waters depend upon the facilities offered by railroads in the marketing of the larger portion of their production.

Acting on these premises, the Fredericktown Coal & Coke Co., of Fredericktown, Pa., some months ago, constructed a long aerial tramway spanning the Monongahela River at Martin, Pa., connecting its Sandy Run mine on the eastern side, in Greene County, with the Monongahela R.R. on the opposite shore, in Fayette County. Prior to the installation of this tramway, which was put into operation last June, the company depended entirely upon the river for the transportation of its coal, as the nearest railroad line on the Greene County side is several miles distant. Since its completion new markets have been developed for the mine product. Much of the output is sold to railroads but during the boom of November, 1926, some of it was shipped overseas. Normally, this coal, which is mined from the Sewickley bed, is sold in competition with that coming from the Pittsburgh seam.

The mine mouth is about 3,000 ft. inland from the river and is connected with the loading terminal of the aerial tramway by a single-track haulway. This tramway is constructed with 70-lb. rails, lies practically level and is served by one 13-ton locomotive which handles from 1,500 to 2,000 tons of coal daily.

At Martin the Monongahela River is about 800 ft. wide and is navigable. Consequently, the construction of the aerial tramway was governed by specifications issued by the War Department. The most important

of these was that a minimum clearance of 65 ft. above flood stage should be provided. This requirement was met by an 800-ft. rope span, supported by a steel tower upon either bank of the stream. Each of these towers is over 90 ft. high and is located close to the water's edge. The track cables and traction ropes droop from the tower on the western side of the river to a loading terminal, directly over which is a mine-car dumphouse. On the eastern shore, the cables and ropes are inclined downward from the supporting tower to an unloading terminal which adjoins the rear end of the tippie. Each of these structures is independently constructed and anchored.

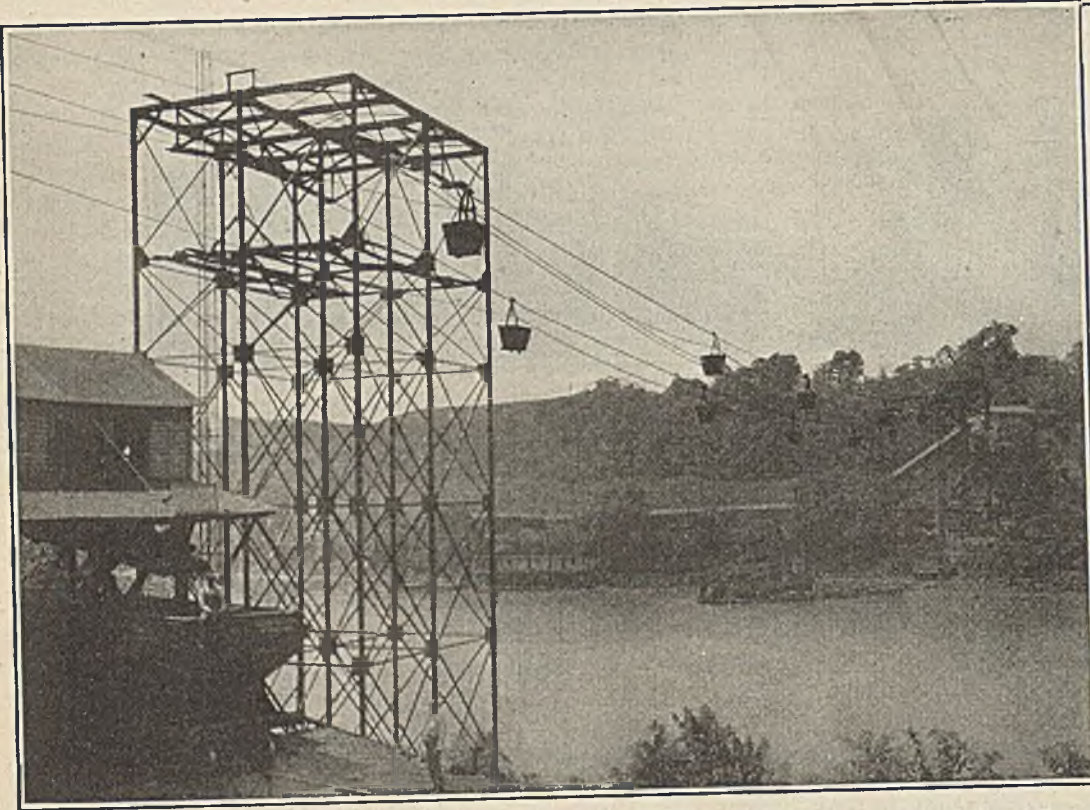
PERFORMANCE EXCEEDS EXPECTATIONS

The calculated duty of the tramway is 200 tons per hour, but its performance indicates a somewhat greater actual capacity. In January of this year it handled 44,277 tons in 26 working days, or an average of 1,703 tons per day. The maximum amount of coal transported by it in any one day was 1,910 tons.

The floor level of the dumphouse, which rests on the edge of a hill, is about 100 ft. above the full-pool stage of the River. Coal is discharged from mine cars by a crossover dump and deposited in a hump-bottomed bin of 15-ton capacity. This bin is designed as a part of the loading terminal and is intended to function as though it were divided into two compartments. The humped bottom causes the coal to flow to the north or to the south sides of the bin, or to both simultaneously, to one or both of two feed doors. Through the north door the coal is discharged into the buckets of the aerial tramway; through the south door it is fed to a retarding hillside conveyor, having a drop of about 70 ft., by which it is discharged to a 42-in. belt conveyor, 380 ft. long, which connects the dumphouse to the river tippie. Both doors are mechanically operated but are manually controlled through a clutch. The combined capacity of the rail and river tipples is about 3,000 tons per day.

Each bucket has a capacity of 50 cu.ft. or about 1½ tons of coal. As ordinarily loaded, however, it carries only 1 ton. As originally designed, the tramway was provided with only 17 buckets but is now operating with 22. They dump through the bottom, a feature which

The aerial tramway shown in the headpiece is unusual in several respects. The river span is 800 ft. long and inasmuch as the stream is navigable the War Department specified a clearance of 65 ft. above flood- and 75 ft. above full-pool stage. The capacity—200 tons per hour—is unusually large for the conditions here encountered. Carrying coal is more difficult than conveying limestone, ore or other heavy material because coal is comparatively bulky thus demanding greater bucket capacity which in turn increases the dead load.



**Fig. 1—Looking
Across River**

On the farther bank the nearest railroad was miles away. By providing means whereby the coal could be carried across the stream two outlets were secured for the mine output. Transportation by water is usually considered cheaper than movement by rail. The railroads, however, frequently reach markets and customers that are situated remote from the river. It was for the primary purpose of broadening its markets that the owners were impelled to build this tramway. It has accomplished this object.

simplifies automatic tripping and latching. They are provided with a safety catch which prevents accidental dumping over the river. The load is evenly distributed on the track cables because the buckets are suspended from a four-wheel trolley. The track cables are of the lock-coil type and have diameters of $1\frac{3}{4}$ and $1\frac{1}{2}$ in. on the load and empty sides respectively. The traction cable is $\frac{3}{4}$ in. in diameter and is pulled by a 15-hp. motor.

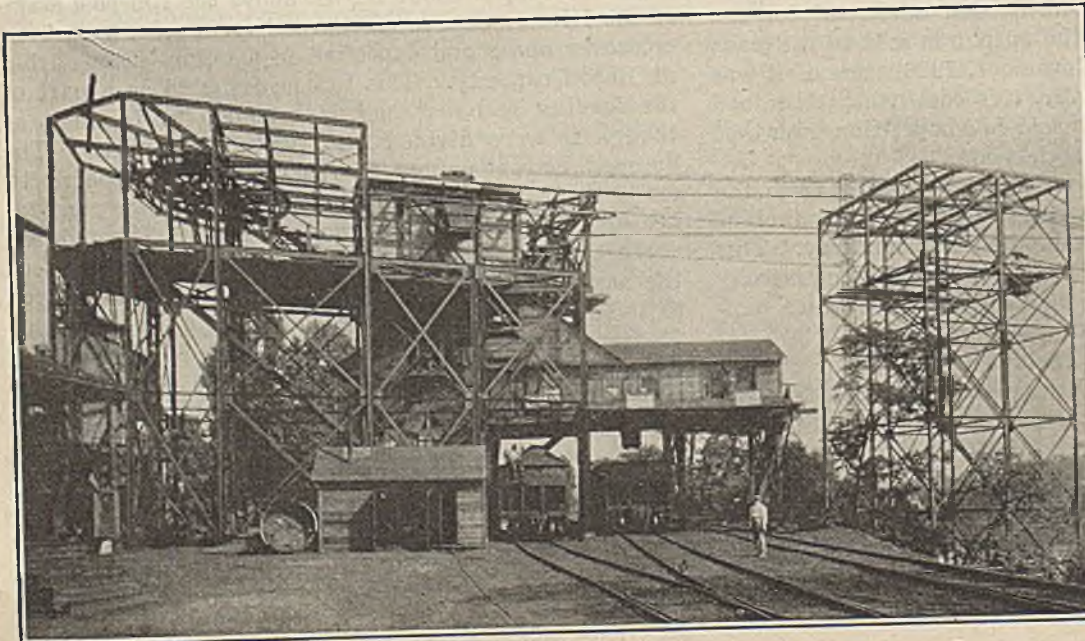
The loading terminal is constructed chiefly of wood. The cable grips which are of the friction type are automatically released from the traction rope and the buckets gravitate to the storage bin where they are stopped by hand and loaded. They are then pushed by hand to the point where they are automatically regripped.

One man and three boys are employed in the operation of the loading terminal. The three boys spot and space the buckets while the man loads them. The unloading station, on the other hand, operates automatically. As a result the services of the four attendants above men-

tioned represent all the labor involved in the operation of the entire tramway.

It would seem that in these days of intense mechanization and automatic control, at least the services of the three boys could be eliminated by the installation of some mechanically operated bucket-spacing and spotting device. For that matter, the opening and closing of the bin doors and the automatic measurement of a bucket-load of coal should involve no insuperable problems. The services of the one man, perhaps, would still be required for the most satisfactory operation of the system. In attending an automatic plant such an operative might well be stationed at a push-button control panel, located at some point of vantage in the loading station.

As already indicated, the all-steel unloading terminal is independent of the tippie which is largely built of wood. These two structures are so arranged that the vibration in the tippie, caused by the shaker screen, is



**Fig. 2—Discharge
Terminal**

Unlike the loading terminal, that at the discharge end of this tramway is entirely automatic in its operation. The discharge tower and the tippie are two entirely separate structures. Thus the vibration of the screens in the preparation plant is not transmitted to the tower and the stress of the tension on the ropes is not imposed on the tippie.

Men and Women of the Mines II—A Monthly Man

By H. S. Geisner
Birmingham, Ala.

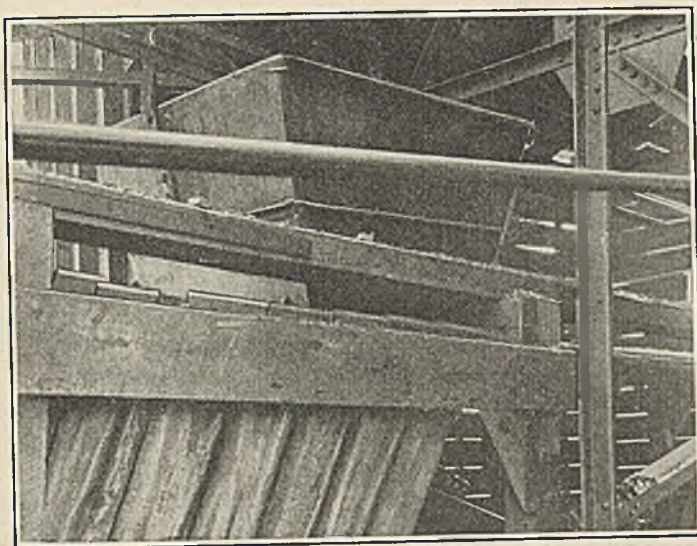


Fig. 3—Bucket in Dumping Position

All buckets dump from the bottom, this detail greatly simplifying the tripping and latching operations. Discharge takes place at full speed. Guides allow the door to open and close gradually after it has been tripped.

not imparted to the unloading terminal nor to the ropes attached to it. Conversely, the heavy stresses caused by the tension weights of the track cables are not transmitted to the tippie.

At the unloading terminal the buckets negotiate the 180-deg. turn without being detached from the traction rope. The turn is made on an unusually large sheave—17½-ft. diameter—which imposes a minimum stress upon the buckets and the supporting members. The buckets are opened and closed automatically. The coal discharged from them is chuted to the shaker screen. The tippie is arranged for the preparation of lump, nut and slack or for the shipment of run-of-mine.

Complete facilities for shipping by rail—the aerial tramway, the tippie and the railroad siding—cost about \$100,000. This expenditure and its reflection on the cost per ton of the coal produced has been more than justified by the new markets gained as a result of the installation. The Sandy Run mine has not been idle a single working day since this equipment was put into operation. This fact alone makes further explanation of its economic advantages unnecessary. The aerial tram equipment was furnished and erected by the A. S. Leschen & Sons Rope Co., of St. Louis, Mo.

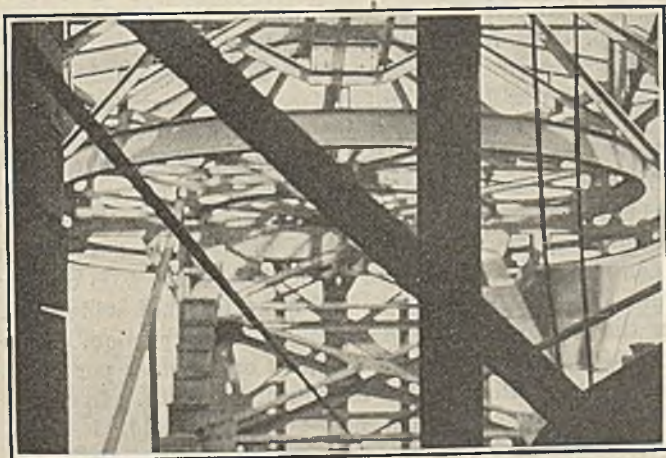


Fig. 4—Sheave at Unloading Terminal

This sheave is of somewhat unusual size being 17½ ft. in diameter. It is thus sufficiently large to allow the buckets to turn through 180 deg. without placing any great stress upon either the buckets themselves or any of the supporting members. The buckets remain gripped to the traction rope while making this turn.

He was the chief clerk. Inasmuch as the office boasted one other clerical man he was really and truly what his title implied. The wife of one of the miners always said, when his position became the subject of conversation, that his position was designated as time keeper until they gave him the more pretentious title in lieu of a raise which he demanded some years before but could not earn. He was that kind of an individual beyond doubt but no one would have convicted him of even a minor crime on the strength of a miner's wife's testimony because every one in the camp knew that all of the miners' wives despised him.

The basis of this animosity between the miners' wives and the chief clerk was puzzling to the superintendent and it took him a long time to unravel the mystery. But unravel it he finally did.

The chief clerk earned a considerable amount of money "on the side" by selling sick and accident insurance to the monthly men on the payroll and tickets for raffles that he sponsored, to miners and their helpers. The company had the customary monthly pay day but at any other time the employees were permitted to draw checks redeemable at the commissary for approximately the full amount due them on the payroll. The chief clerk was the sole judge of how much credit each employee should be allowed and he alone decided when to put the stoppages on the roll.

A CASE OF BUY OR BE DAMNED

Suppose a miner came to the window about the middle of a month and requested a commissary check for \$10. Perhaps the payroll showed a credit of twice this amount for coal mined but that day the rent stoppage of \$12 was put against him and possibly \$1.50 for the doctor. If this man would suggest that he wanted two raffle tickets the chief clerk might agree to let the stoppages go over for a few days and in addition he would look on the tally sheet for the current day (which he was not obliged to do) and find a further credit of perhaps \$5. If a monthly man suggested that he desired an insurance policy his stoppages would likewise move forward on the calendar.

KEPT AWAY WOMEN BY DISCOURTESY

But what had all this to do with the wives?

Many of the men preferred to have their womenfolk go to the window and draw checks for them while they were at work and the company permitted them to send their wives on such a mission. Not being able to sell insurance or raffle tickets to these women the chief clerk decided that he might keep them away from the check window if he could make the procedure of drawing checks distasteful enough to them. He succeeded so well in this respect that most of the women managed to convince their menfolk that it was to their advantage to draw their own checks as the chief clerk always outwitted them in the matter of stoppages about which they knew nothing.

The profits from his raffles was well worth while. Twice a week on an average he sold twenty \$1 tickets and the lucky number won a \$12 watch or pistol.

Eventually the men rebelled against his tactics and the chief clerk, foreseeing a whirlwind, departed before the resentment became audible.

Rock Dusting Is More Effective in Preventing Coal Dust Explosions Than Water*

Ventilation of Mine and Temperature of Air Have Small Influence on Initiation and Propagation of Coal Dust Explosions—Important Factors Are Quantity and Quality of Dust and Volume of Workings

By P. H. Burnell

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ALTHOUGH THE EFFICIENCY of rock dusting as a means of preventing coal dust explosions has been recognized for many years, it is only recently that operators in the West have seriously considered using it in their mines. The general inefficiency of water as a means of rendering coal dust non-explosive is shown by the many dust explosions that have occurred in mines where sprinkling was carefully and thoroughly practiced. Although it would appear that a certain amount of sprinkling might supplement rock dusting in workings where the use of this latter agency is more or less impractical, there is no question but that coating the ribs, roof and floor of a mine with a sufficient quantity of rock dust will render the fine coal particles harmless.

A dust explosion results from the rapid burning of fine particles of coal suspended in the air. The violence of such an explosion is determined by the quantity of methane present, the amount of moisture in the dust and in the air, the flammability of the dust and the volume of the workings in which the explosion occurs. The influence of this latter factor on the extent of a dust explosion is frequently overlooked. This is particularly noticeable when the explosion originates in or near workings where the pressure is reduced on passing into an area of greater volume. If such an explosion dies out this circumstance may be attributed to the absence of coal dust, to efficient sprinkling or, possibly, to rock dusting. This assumption is not always correct. Many explosions are localized because dust is not thrown into the air in sufficient quantity to propagate inflammation. It is evident that pressure is necessary if propagation of an explosion is to continue. The confinement of the gases by the walls, roof and floor develops a longitudinal movement of the air that must have enough velocity to raise sufficient clouds of dust to continue the ignition. Unless the gases are confined, therefore, enough mechanical agitation of the coal dust will not result and the flame will quickly die out.

The principal sources of coal dust at the face are: (1), Coal drilling—formation of dust during this procedure is practically unavoidable but the quantity is small; (2), machine cutting—the production of dust in this operation can be greatly reduced by using water on the cutter-bar; (3), undercutting and shearing the

coal with hand picks; (4), blasting of the coal; (5), coal falling from mine cars and then being ground to powder under the wheels or on the mine floor. This latter is one of the greatest sources of coal dust in roadways and can be almost entirely avoided by using tight cars without end gates and by applying but little topping. A sixth source of dust is encountered in workings where crushing, squeezing, spalling or bumping occurs. In most cases formation of dust can be lessened by thoroughly watering the face before blasting and by wetting down cars as soon as they are loaded. Long-face and concentrated methods of mining should also reduce the quantity of dust because of the smaller workings required to produce a given tonnage.

Coal dust may become suspended in the air through any of the following operations: Shooting the coal is one of the greatest evils, particularly where excessive quantities of explosive are used. In this process coal dust is blown into the air from which it is deposited

on the timbers and in the gob. The finest dust is sometimes carried into the entries where it lodges on all exposed surfaces. The movement of trips along the entries, especially at high rates of speed and in strong air currents, also raises some dust.

To initiate an explosion a dense cloud of flammable dust must be suspended in the air and a source of ignition supplied. Ignition of the dust may result from the use of an open light in the presence of methane, from an electric arc or spark or directly from an open light or torch in the presence of dust.

The Bureau of Mines appears to have established the fact that the flammability of coal dust varies with its fineness, its moisture content and with its ratio of volatile combustible matter to total combustible. The quantity of dust necessary to produce an explosion also has been determined by the Bureau. As a result of experimentation, the lower explosive limit of coal dust has been fixed at 0.032 oz. per cubic foot, while 0.08 oz. per cubic foot is stated to be the quantity that will result in the most rapid propagation of an explosion. In a 6x12-ft. entry, a density of 0.032 oz. of dust per cubic foot is equivalent to 2.3 oz. per linear foot. In mines where the dust hazard has been neglected, 1 lb. of —20-mesh dust (which is explosive) per linear foot of entry is not uncommon. The danger inherent to such a condition is obvious.

It is not generally believed that ventilation seriously affects—except in so far as it eliminates methane from

All mines producing bituminous or lignite coal, whether gaseous or not, are liable to dust explosions. Therefore, they should be rock dusted unless all coal dust on the floor, ribs and roof is in a muddy condition. The rock dusting of each mine offers a separate problem that deserves careful study. Rock dusting will be most efficient in mines using either the isolated panel or longwall systems.

*Abstract of a paper entitled "Rock Dusting," presented before the winter meeting of the Rocky Mountain Coal Mining Institute, held in Denver, Colo., Feb. 23 to 25.

the workings—the initiation or propagation of a dust explosion. This is because the initial concussion momentarily raises the dust into the air at the required density regardless of the velocity of the air current.

It has been believed by some that air currents of the usual velocity would stir up rock dust in mines where this material is employed, to such an extent that the air would be disagreeable, if not actually injurious, for the men to breathe. Investigation has shown that exceptionally fine coal dust is thrown into suspension at velocities of 1,200 ft. per minute and that the larger particles, ordinarily deposited from such air currents, are again picked up at velocities of 1,600 ft. per minute. On the other hand, velocities of 2,600 ft. per minute are required to move shale dust. It also might be added that the velocity of an unusually slow explosion is always greater than 3,000 ft. per minute.

The temperature of the air apparently exerts but little influence on the ignition of coal dust. Explosions of this material have originated when the temperature of the air was approximately 0 deg. F. and many have started at the working face where the temperature is usually

somewhere between 55 and 62 deg. F. However, seasonal variations may have an effect where rock dusting is employed. This operation appears to serve its purpose on the main intakes during the winter months when the roads are usually dry due to the fact there is but little moisture in the air. During the summer months this condition may be reversed because the air currents usually carry moderately large quantities of moisture, as a result of which the roads may be so damp that the rock dust that has been broadcast cannot be relied upon to rise in a cloud in the event of an explosion.

The use of rock dust as an aid in wetting down coal dust is also an interesting application. It has been proven that coal dust mingled with shale or limestone dust absorbs water more readily than when not so mixed. In fact, dry coal dust is extremely difficult to wet. It has a tendency to repel water and unless there is mechanical mixing of some kind the dust will float on the surface of pools for an indefinite period. Therefore where watering is employed, rock dust is of great assistance in keeping the mine dust wet. It has the further advantage of tending to mechanically pack the coal dust.

However, because of the character of the roof, coal or floor it is often impractical to use water. In such mines, rock dusting is the obvious alternative. Where rock dust is applied in sufficient quantities the mine will remain safe, depending upon the quantity of coal dust deposited from the air current, for days, weeks or even months without further treatment. On the other hand where sprinkling is employed the dust may become dangerous if the mine is not thoroughly wet down every day, particularly during the winter season.

Humidification of the intake air, by steam or water sprays, is of no practical value in preventing either the initiation or the propagation of a dust explosion. This

is attributable to the fact that the quantity of water vapor in the humidified air is so small that the heat absorbed in raising its temperature to that developed by the burning coal dust is insignificant. On two occasions, during a series of humidification tests, a mixture containing 25 per cent of water and 75 per cent of coal dust by weight exploded violently. This mixture could be molded by the hands into a compact ball like damp clay. As further evidence that humidification of the mine air is impractical, it may be mentioned that the moisture content of untreated coal dust remains practically constant when exposed to a saturated current of air. The dust takes up additional moisture only when

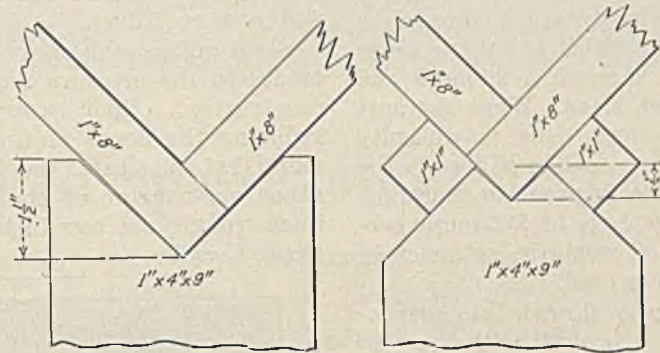
the air is supersaturated and such an air current will be "foggy." On the other hand if wet but untreated coal dust is dried by an air current it will not adhere to the surface on which it is resting but will, when thoroughly dry, rise in a cloud if swept by an air current of comparatively low velocity. Dry coal dust is the most explosive as it readily forms a dense cloud, contains the maximum number of particles and, therefore, exposes the greatest surface for ignition.

To stop the propagation of a dust explosion it is necessary either to prevent the transfer of heat from one particle of coal to another, or else preclude the formation of a dense cloud of dust. Sufficient quantities of dry rock dust will fulfill these requirements. As they are blown into the air by the advance wave of an explosion, the fine particles of rock dust or other non-combustible material serve to more widely separate the flammable particles of coal dust from each other and also to dilute the air necessary for combustion. In other words, the percentage of flammable matter in the air is reduced and its liability to inflammation is consequently decreased. Furthermore, because of its absorptive powers, the non-combustible material lessens the amount of heat that can be transferred from one particle of coal to another. This action of rock dust is comparable to that of air depleted of its oxygen or to the extinctive effect of carbon dioxide when present in firedamp mixtures. As is well known, both of these conditions tend to reduce the explosibility of flammable mixtures.

METHODS USED IN ROCK DUSTING

Rock dust is usually employed in one or both of two ways: Either by applying it directly to the various surfaces in the area to be treated, or by establishing concentrated zones where the dust is placed in boxes or on shelves from which it will be thrown into suspension by the advance of an explosion. It is generally believed that such treatment will prevent an explosion from traveling throughout the workings and will, therefore, protect the lives of all in the mine with the possible exception of those in the immediate vicinity of the point of origin.

Tests have shown that, regardless of the quantity of coal dust present, a given percentage of non-combus-



Types of Troughs Used in Rock Dust Barriers

On the left is shown the usual type of trough which is commonly about 8 ft. long. The stringers, on which the troughs are set, are supported either on cross bars or hung from the roof. Each trough has a capacity of from 125 to 150 lb. of rock dust. To tip the modified trough shown at the right requires only about one-quarter of the pressure needed by the first type.

tible material in a dust mixture will prevent the propagation of an explosion. The amount of rock dust to be used in any entry depends directly upon the quantity of coal dust already present and that which may be deposited in the immediate future. Therefore in any application of rock dust it is advisable to previously remove, and further prevent so far as possible, all accumulations of coal dust.

In applying rock dust care should be taken to use a sufficient quantity to insure that this material will assume its natural angle of repose on all rough surfaces. The size of the particles of rock dust is an important factor in determining the readiness with which the dust will adhere to the mine surfaces. The finer the material, the more readily and tenaciously will it cling to the ribs and roof. Limestone dust, which is used in some mines, averages 100 per cent through a 20-mesh and 50 per cent through a 200-mesh, sieve. When the dust is applied by hand, as is sometimes done, no difficulty is experienced in causing a heavy coat to adhere to the smooth surfaces of the coal. It is probable that rock dust containing a smaller percentage of 200-mesh particles than previously mentioned would be satisfactory if a sufficient quantity of it were used.

When rock dust is mechanically thrown into suspension in the mine air and allowed to drift with the ventilating current, the finer the particles the more efficient will be the distribution. As the cost of preparing rock dust increases with the fineness of the particles, it is naturally desirable to use the coarsest material that will give satisfactory results with the particular method of distribution employed. The customary fineness is such that at least 95 per cent of the dust will pass a 20-mesh, and 25 to 30 per cent a 200-mesh sieve.

Several different types of mechanical blowers, that can distribute rock dust more cheaply than by hand, are now in use. However, care should be taken in applying dust with these machines particularly where the coal dust is extremely dry or the ribs and roof have not been washed down with water. In event that the feed from the hopper should fail during the operation of the blower, a dangerous condition may result from raising the dry coal dust from the ribs, roof and floor. Extreme care should be exercised to prevent ignition of the dust thus thrown into suspension.

As a safety measure mechanical dusting should be undertaken, so far as possible, only when the majority of the men are out of the mine. If possible, also, the air current should be so arranged that any coal dust that is thrown into suspension will be carried out of the mine or at least not into a section that has already been rock dusted.

Although rock dusting by hand is the more expensive method, it is preferable in zones where barriers are used and in all pump, underground hoist and transformer rooms. When extracting pillars, particularly in workings where coal is shot off the solid, where caves occur frequently or where methane may be generated, rock dust should be applied or the place kept thoroughly wetted down. Pillar workings in many mines, especially in the West, seem unusually dry because of the action of dry air currents. Under such conditions, much of the dust that is settled by sprinkling will dry out and again become dangerous.

Rock dusting by hand is slow and the cost excessive. However, the results are good, for by using this method, as much as 7½ lb. of rock dust per linear foot will

adhere to the ribs and roof. In a 7x9-ft. entry about 20 linear feet per hour can be rock dusted by hand.

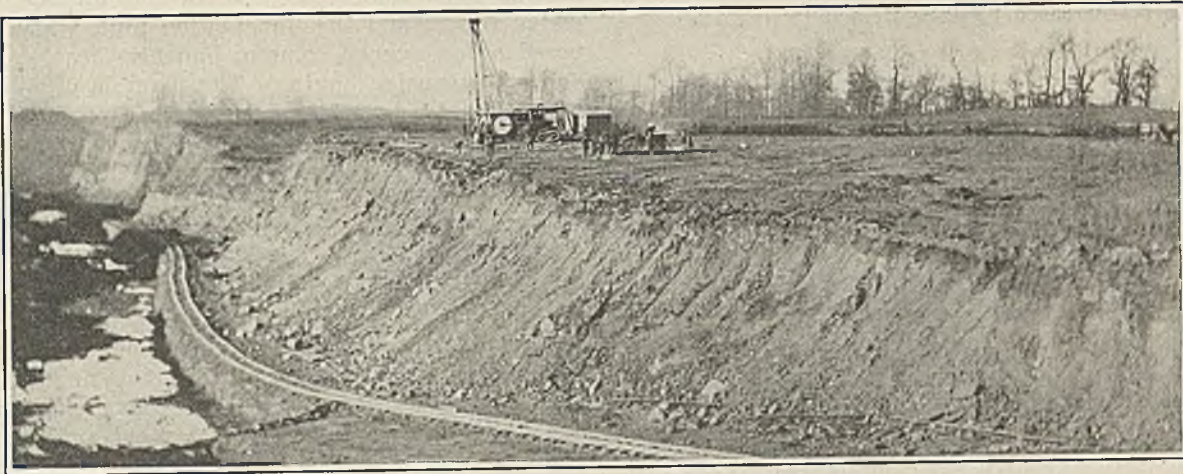
Many types of rock dust barriers have proved to be effective. However, what is known as the V-trough variety has been most commonly used throughout the West. In this type the troughs proper are made from 1x8-in. boards 8 ft. long. These are supported in 1½-in. notches cut in 1x4-in. boards about 9 in. long that are nailed upright at 18-in. centers to 2x6-in. stringers set on a slope of about 1 to 16 and supported either on cross bars or hung from the roof. The slope of the stringers is frequently made both ways, that is, the battery of troughs is highest in the center and slopes toward both ends. Each trough will hold from 125 to 150 lb. of rock dust.

Some unfavorable comment has been made with reference to the pressure required to tip troughs of this construction. Upon experiment it was found that, by reducing the depth of the notch to half an inch and using 1x1-in. cleats, the trough could be tipped with about one-quarter of the pressure formerly required. Such troughs are now installed at the mines of the Owl Creek Coal Co.



What Is the Water Gage in Your Mine?

As high blood pressure in a person is a sign of danger of interrupted circulation and other complications. Similarly high water gage in the ventilation system of a mine is an indication of sluggish air currents due to choked entries. Exactly as the heart is tasked when high blood pressure prevails in the human system, the mine fan does not operate satisfactorily when the ventilating pressure of mine air is high. Old mines in particular are subject to high air pressure and every precaution should be taken to avoid this condition. The cost of doing this is small, for the saving resulting from decreased consumption of power in the operation of a mine fan, for a given output of air, will go a long way toward paying for the cleaning up of ordinary falls in the airways.



Liquid Oxygen Speeds and Cheapens Stripping*

Thorough Shooting of the Overburden So Lightens the Work of the Shovels That Their Dippers Have Been Enlarged and They Are Now Crowding the Drills—Many Thousands of Dollars Are Thus Saved

By George B. Holderer

Mining Engineer, Air Reduction Co., New York City

AN AREA of about 5,000 acres underlain with a good grade of high-volatile bituminous coal is owned and worked by the Enos Coal Co. about nine miles from Oakland City in southern Indiana. This mine has been operated for about five years during which time approximately 350 acres have been stripped. The process of coal recovery is now proceeding at the rate of about 100 acres per year. Improved methods of shooting the overburden have recently been introduced that tend to cheapen coal production at this mine.

In times past this gently rolling area has been farmed. No timber and only a little brush is found upon it. The overburden varies in thickness from 10 to 60 ft. A thin bed of slate immediately overlies the coal. This is surmounted by a stratum of limestone ranging from 3 to 15 ft. in thickness, which in turn, is followed by sandstone, slate, shale and clay. All of these strata vary considerably in thickness throughout the area. The coal, however, is fairly uniform, averaging about 5 ft. in thickness.

The sequence of operations followed in winning this coal is briefly: Holes are put down in the overburden by means of churn drills; these are then loaded and shot with L.O.X.; the cover is removed by means of overcasting steam shovels and finally the coal is loaded out and sent to a tippie for preparation.

In order to show what is being accomplished by the aid of the new explosive the work done from May to November of 1926 inclusive will be compared with that accomplished during the same months of the preceding year. No work was done in No. 1 pit during May of

1925. This renders all figures for this month unduly low.

There are at present in use at this stripping eight No. 44 Loomis clipper drills. These are gasoline-driven and provided with caterpillar traction. Recently they were equipped with extra heavy stems, measuring 26 ft. overall and 4½ in. in diameter, to increase the speed of drilling. In addition, four No. 1½ G, non-traction drills have been acquired. These are employed to save the time of the larger machines when recleaning of holes is necessary.

SPACING IS SAME AS FOR BLACK POWDER

Holes are put down on 18-ft. centers both ways. The same spacing was previously used with black powder. Where the overburden is unusually shallow, the distance between holes may be decreased to 16 ft. Six-inch bits are used, and no difficulty is experienced in securing a fairly smooth hole of full diameter all the way down.

At one time, it was planned to do enough blasting ahead so there would always be a buffer to shoot against, but it has never been possible to realize these plans, as the shovels have always succeeded in keeping up with the drills. However, no difficulty has been experienced in shooting close to a shovel, as the bank generally stands well and rarely is the track covered after a blast.

During wet months about 10 per cent of the holes need to be recleaned, and another 10 per cent are so rough as to make it necessary to lower the cartridges with a piece of copper wire. Most of the bad holes are adjacent to the last blast.

Before L.O.X. was used, it was necessary to spring every hole and, due to the fact that the holes were generally damaged during this process, the drillers became careless believing that they did not need to do careful work in the first place. Now all holes are ready for shooting after the drillers finish, without further preparation, with the exceptions mentioned above.

*From a paper entitled "Liquid Oxygen Explosive in Strip Coal Mining," presented before the winter meeting of the American Institute of Mining and Metallurgical Engineers, February, 1927.

In the headpiece may be seen a general view of the strip pit where the new explosive is being used. So thoroughly is the overburden shattered that the size of the shovel dippers has been increased. The shovels now crowd the drills to keep ahead of them.

Table I—Increased Footage Drilled During 1926

All Pits	Number of Holes		Aggregate Depth of All Holes		Average Depth per Hole	
	1925	1926	1925 Ft.	1926 Ft.	1925 Ft.	1926 Ft.
May.....	338	1,005	9,121	28,238	26.9	28.0
June.....	697	878	19,419	27,693	27.8	31.5
July.....	795	1,006	21,889	29,741	27.5	29.6
August.....	919	963	24,257	26,227	26.3	27.2
September.....	650	949	20,086	26,025	30.8	27.4
October.....	613	940	16,976	31,532	27.6	33.5
November.....	604	853	15,848	33,489	26.4	39.3
	4,616	6,594	127,596	202,954	27.6	30.8

As will be seen from Table I, 62.9 per cent more footage was drilled during May to November of 1926 than in the same period of 1925. This resulted directly from the use of L.O.X. With the easy digging in thoroughly shattered ground, the shovels are always just behind the drills, and not infrequently have to wait for them to move so that a blast can be fired. All drilling is done on contract, and because of the greater footage since the advent of the new explosive, a lower price per foot has obtained. It will also be seen from the table that the average depth of overburden was greater in the 1926 period than previously. In fact the deepest overburden that so far has been worked on this property was encountered.

During the summer of 1925 three trial blasts were made with L.O.X., the liquid for its preparation being shipped from Lebanon, Pa., a distance of over 800 miles. These blasts were so successful that the present plant for making liquid oxygen, which has now been in constant operation since April 15, 1926, was acquired. No attempt will here be made to enter into any theoretical considerations of this new explosive. These have been fully dealt with in other papers.

This plant is not an experimental one in any way; it is in 24-hr. commercial production and the mine depends upon it for its daily supply of explosive. It is, however, the first direct commercial outcome in the United States of the experimental work that has been conducted since 1922 by the Air Reduction and Ingersoll-Rand companies, in developing liquid oxygen explosives to fit the requirements of American methods of mining.

This plant utilizes the Claude process of liquefaction. It consists of soda towers for the removal of dust and carbon dioxide from atmospheric air; a compressor for compressing the air to 900 lb.; desiccators for re-

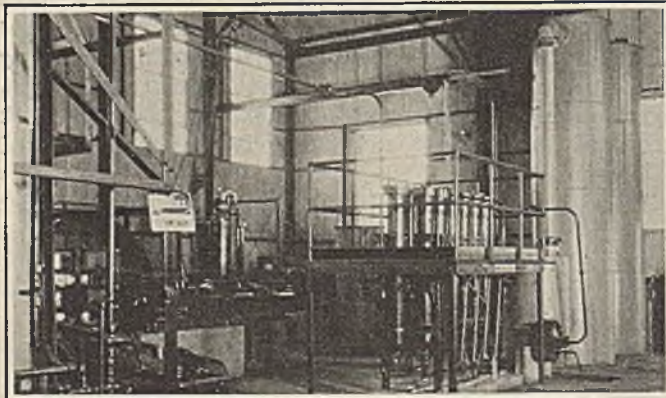


Fig. 1—Compressor, Desiccators and Soda Towers

In order to obtain a reasonably pure final product it is necessary to remove all dust, oil and water vapor from the air. It must accordingly be treated with this end in view after its compression and before liquefaction. An every-day purity of 96 per cent is attained at this plant.

moving remaining traces of carbon dioxide, oil and water vapor; and the liquefaction unit, which is composed of an oxygen column, liquefier, heat exchangers and an expansion engine. The plant is producing 180 lb. of liquid oxygen per hour, with a purity of 96 per cent. Calculations are based on normal temperature and pressure. The operating crew consists of 3 men, who were recruited locally and have had previous experience in operating compressors.

At the present time the liquid is stored in vacuum containers. Several of these hold 35 lb. each, twelve are capable of holding 125 lb. and one 250 lb. This method is not an economical way of handling the liquid and, therefore, is temporary. There is under consideration the purchase of one large container which will hold the 24-hr. production of the plant or 4,500 lb.

COMPOSITION OF CARTRIDGES

The cartridges consist of cotton bags $4\frac{1}{2}$ in. in diameter and 18 in. long. These are filled with carbon, having a weight of 3.1 lb. This filling is done by a machine which was designed for the purpose, and which gives a firm cartridge of uniform weight, at an average rate of $3\frac{1}{2}$ per min. One operator and helper are employed part time on this operation. The operator fills the bags, while his helper closes them with brass clips.

The soaking boxes are of balsa wood, copper-lined. They are 30 in. wide 40 in. long and 20 in. deep. This is the most efficient type of box yet devised for soaking and transporting this explosive. Extra cartridges returned several hours after they are sent out have lost but little of their full weight. A test was recently made in which several cartridges were returned after a period of 8 hr.; when fully soaked they weighed 12 lb., and at the end of the period mentioned they had lost only $\frac{1}{2}$ lb. Two men load the boxes and do the soaking, getting the cartridges ready for the blasting crew.

From about the middle of April to the middle of November the roads in this locality are good enough to permit the use of a truck for distributing the explosive. The boxes containing the saturated cartridges are loaded onto such a truck at the plant and taken directly to the holes that are to be shot. During the five wet winter months the roads become impassable for hauling and it then becomes necessary for the dinkey supply engine to take out the boxes on a flat car to a central point, where they are loaded on a wagon and hauled to the holes at the pits. The supply engine does not devote more than 2 hr. per day to explosive distribution.

Each of the large-size soaking boxes will hold 54 of the $4\frac{1}{2}$ -in. cartridges, the entire weight of the cartridges, liquid and boxes being about 1,100 lb.

NEW METHOD PARES COSTS

When ordinary explosive was used the holes were frequently sprung as many as four times with 40 per cent gelatin dynamite, approximately 2 lb. being used for each charge. This made a total of 8 lb. Two springing charges would, perhaps, be a fair average for all the holes: this meant 4 lb. of dynamite and two caps, plus the labor of loading each hole. After springing the holes were loaded with black powder and a primer of 40 per cent gelatin dynamite containing an electric cap was placed on top of the charge, which was then stemmed with clay.

Under the old procedure the blasting crew consisted of a foreman and eight men, also one or more teams and teamsters. This crew would usually spring and

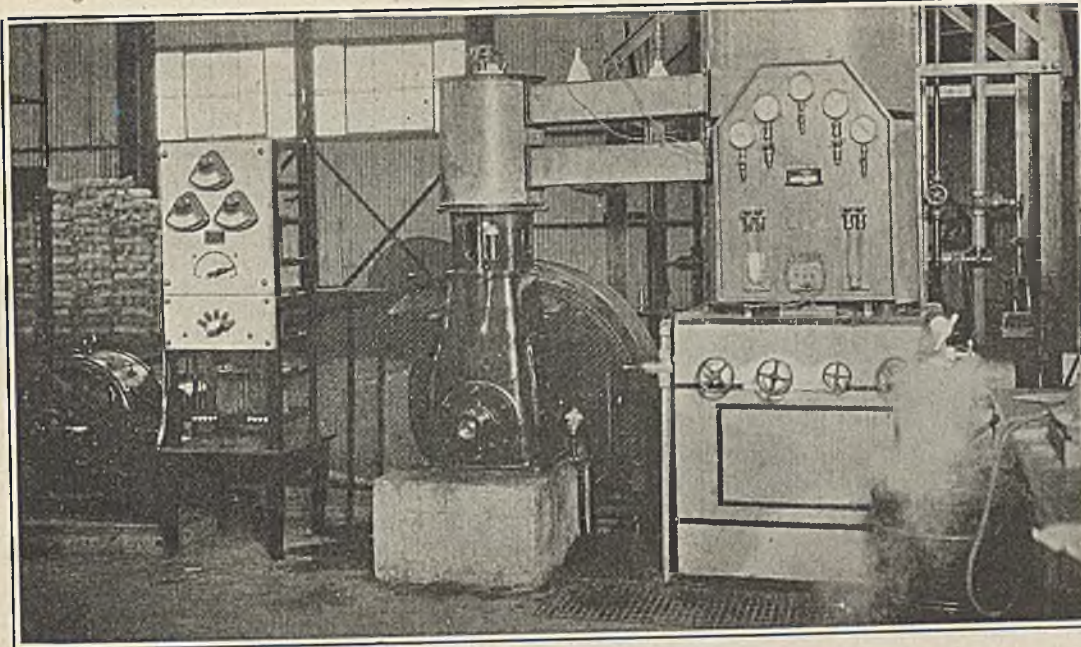


Fig. 2—Liquefaction Equipment

This shows the liquid oxygen columns and the expansion engine. The liquid oxygen can be separated from the liquid nitrogen because of the difference in their boiling points. Although both of these are well below the solidification temperature of mercury they are separated by a sufficient interval so that the nitrogen may be distilled off leaving the oxygen behind.

shoot the holes at two pits in an 8-hour shift. Under the present procedure a foreman, four men, and a truck, make up the crew during seven months of the year. During the five wet months the crew consists of a foreman and 5 men (two of whom are detailed to cleaning holes), a team and teamster, together with four or more trips of the dinkey supply engine. All four pits worked are shot every day, some of them being shot twice.

Table II—Comparison of Shooting Labor

	1925	1926
May.....	\$ 639.00	\$1,160.00
June.....	1,324.00	1,085.50
July.....	1,298.00	1,055.75
August.....	1,584.75	1,366.70
September.....	1,146.50	1,280.60
October.....	1,173.00	1,082.50
November.....	1,383.20	1,523.00
Total.....	\$8,348.45	\$8,554.05

The high labor charge shown in Table II during the period when L.O.X. was used is due to overtime caused by waiting for the drills to complete a group of holes. Actually 62.9 per cent more shooting was done, yet if the drills could keep far enough ahead of the shovels no time would be lost in waiting for holes, and all the shooting could be done in one 8-hr. shift.

EACH MAN TAKES FOUR CARTRIDGES

While the blasting crew is waiting for the arrival of the truck or team, those holes requiring it are re-cleaned and cordeau placed in all of them. When the soaking boxes arrive, the truck driver, or teamster, hands out the cartridges. These are then dropped into the holes as fast as they can be carried to them. Each man takes four cartridges at a time or an aggregate weight of 50 lb. As the loading is finished, the holes are stemmed with clay, which is cut with narrow spades from the collars of the holes. This material is not tamped. Electric caps in series are then connected to each piece of cordeau, and after final warning whistles have been sounded from the shovel, and battery connections made, the blast is fired.

The crew soon become expert in handling the L.O.X. cartridges. Throughout a period of several months the average time required for loading and firing a round of holes up to 15 in number has been 25 min.; rarely is

over 30 min. required for groups of more than 15 holes. The effective life of the cartridge is such that up to 2 hr. could be consumed if necessary. The work proceeds easily and smoothly, with no sign of haste anywhere. One cartridge is loaded for approximately every 5 ft. of hole. The weight used is half that of the black powder it replaces. A considerable difference is also noticed in the actual amount of material handled. No difficulty has ever been experienced in successfully loading and blasting wet holes.

One 4½-in. cartridge 18 in. long, weighing 3.1 lb. when dry and 12 lb. or slightly more when fully saturated, replaces one 25-lb. keg of black powder. Allowing 2 lb. of liquid oxygen in each cartridge for evaporation there are then 10 lb. of explosive actually available at the time of firing. Thus 1 lb. of L.O.X. in reality replaces 2.5 lb. of black powder. One pound of this explosive at the time of firing will also replace 1.5 lb. of 40 per cent gelatin dynamite.

The rate of detonation of L.O.X. is 4,500 m. (14,760 ft.) per sec. It is thus many times as fast as black powder. Such a high rate gives a pronounced shattering effect and results in fine fragmentation. Formerly large boulders were the rule, and were accepted as an evil which could not be avoided. Now the ground is so thoroughly shattered that a large piece of rock is an exception and there are likely to be loud complaints when one is found.

The figures in Table III include, under 1925, the cost of black powder, dynamite used for springing and priming, and electric caps. With the L.O.X. are included the cost of dynamite for re-cleaning, cordeau fuse and electric caps. It will be seen that the cost of the L.O.X. has steadily decreased as better ways of handling and sav-

Table III—Cost of Explosives

(Caps, fuse and dynamite are included in both cases)

	Black Powder 1925	L.O.X. 1926
May.....	\$3,477.35	\$8,100.66
June.....	9,568.84	8,180.49
July.....	9,779.85	6,028.97
August.....	9,975.16	5,949.46
September.....	8,787.44	7,157.03
October.....	7,913.90	5,469.76
November.....	6,893.38	5,639.00
Total.....	\$56,395.92	\$46,525.37



Fig. 3—Loading Holes

Each cartridge weighs about 12½ lb. They are taken from the soaking boxes and dropped into the drill holes as quickly as possible. Although these cartridges are intensely cold they nevertheless “steam” perceptibly when taken from their container. Note the vapor around each cartridge and also that arising from the open box. It is oxygen, not water, vapor.

ing the liquid oxygen have been devised. The high costs in May and June were due to cartridges made in New York and shipped to the mine at considerable expense, before the cartridge machine was gotten into operation.

It will be noticed further that during the L.O.X. period 62.9 per cent more hole was blasted, at a cost of approximately \$10,000 less than during the 1925 period. In other words, if the new explosive had not been used, but the 1926 footage had been blasted, it would have cost \$91,925.48, instead of \$46,525.37. Thus a direct saving on explosives alone of \$45,400 or 49 per cent may be credited to L.O.X. during this period. It is believed that this figure can be increased still further.

MANUFACTURING COSTS TABULATED

Manufacturing costs for the month of October, 1926, were as follows: Liquid oxygen plant, labor, power and supplies, \$1,729.90; cartridge plant, labor and materials, \$2,419.54, making a total of \$4,149.44. Cartridges to the number of 6,863 were used, hence the cost of each was \$0.604. Each cartridge replaces a 25-lb. keg of black powder at 7c per lb. (\$1.75) or 15 lb. of 40 per cent gelatin dynamite at \$0.135 per lb. (\$1.92). During this month 102,827 lb. of liquid oxygen were manufactured, at a cost of \$0.0168 per pound.

Black powder was formerly purchased in carload lots. Because of an inability to unload promptly, these cars would sometimes stand at the tipple for 2 or 3 days. Powder was hauled by wagon to a centrally located magazine, from which it was distributed daily by team to the various pits. A comparatively large number of men either came in contact with the powder or had occasion to be nearby while it was being handled and transported, thereby increasing the hazard to life and property.

SHORTENS DURATION OF HAZARD

In the case of L. O. X. the largest quantity of explosive that is on hand at any one time is that contained in two boxes, or about 1,000 lb. These boxes are hauled directly from the plant to the pits, making the actual duration of hazard comparatively short. The constituents, carbon and liquid oxygen, are in themselves not dangerous; however, when the cartridges are soaked they form an explosive, and should be handled as such. If, for any reason, a hole is missed, after the lapse of a few hours the liquid oxygen will evaporate and the cartridges are then inert. There is, therefore, no possi-

bility of an explosion occurring when they are struck by the shovel. There is no danger of cartridges exploding accidentally because of a spark from the shovel or dinkey. They would burn but not detonate.

Because of the thoroughly shattered condition of the ground shot, it was found that the capacities of the dippers on the shovels could be increased by an extra yard. The bigger dippers have only been in service a few weeks, but so far the operators say that no extra strain has been imposed on the shovels. Three of these machines were in a bad state of repair at the beginning of the L. O. X. period; unfortunately it was not possible to shut them down to make complete repairs and start with a clean slate; the continued demand for coal throughout the summer made it necessary to keep all the shovels in operation as long as possible, and it was only recently that time was found to make the necessary repairs. However, the easier digging rendered it possible to keep these shovels in operation when, under ordinary circumstances, a shutdown would have been imperative. It is estimated that repairs on the shovels will be cut in half on account of the easier digging which the new explosive has made possible.

The widths of the cuts made are between 65 and 70 ft. An average of 5 cu.yd. of overburden per ton of coal reclaimed has previously been considered the economic limit. It is now believed profitable to strip up to 7 cu.yd. per ton of coal.

Table V shows the number of cubic yards of overburden moved in each of the four pits, together with the time taken for repairs during the month under comparison. A decided improvement will be noted in the performance of each of the shovels, and now that all of them have had the capacity of their dippers increased and are in good repair, the yardage moved should be more nearly in direct proportion to the increase in footage of the churn drill holes than has been the case heretofore.

Four 2-cu.yd. Bucyrus shovels are used for loading coal. The drill holes put down in the overburden do

Table IV—Shovel Types and Capacities

Pit No.	Type Shovel	Old Capacity Cu.Yd.	New Capacity Cu.Yd.	Boom Length Ft.
1	Marion No. 300	6	7	90
2	Bucyrus No. 225	6	7	80
3	Bucyrus No. 175	3.5	4	70
4	Bucyrus No. 225	6	7	80

Table V—Comparison of Overburden Moved in 1925 and 1926

	Pit No. 1		Pit No. 2		Pit No. 3		Pit No. 4	
	1925 Cu.Yd.	1926 Cu.Yd.	1925 Cu.Yd.	1926 Cu.Yd.	1925 Cu.Yd.	1926 Cu.Yd.	1925 Cu.Yd.	1926 Cu.Yd.
May.....		81,110	75,171	96,575	47,800	83,116	86,814	112,340
June.....	104,026	94,581	115,844	102,798	17,585	84,678	91,574	109,595
July.....	91,574	44,040	112,481	101,475	63,672	74,350	92,400	127,173
August....	102,310	7,750	117,150	88,436	93,242	73,928	126,952	122,495
September..	96,840	109,185	82,413	109,547	71,155	82,206	95,112	82,978
October....	75,137	112,811	109,600	8,300	78,337	72,836	108,317	143,300
November..	90,048	106,165	117,800	51,041	64,580	45,622	110,115	127,840
Total....	560,935	555,642	730,459	558,172	436,371	516,736	711,284	825,721
Days out...	45	47	8	35	41	19	6	7

not penetrate the slate immediately overlying the coal bed. Hence, the coal is never shattered when the overburden is blasted. The bed is carefully swept before being taken up. This results in clean coal going to the tipple.

The benefits accruing from the adoption of the new explosive may be summed up as follows. Because of the necessity of keeping out of the way of the shovels since the new explosive has been adopted more and faster drilling of overburden has had to be done. The greater footage drilled has resulted in a lower price per foot.

Shooting has been done at lower cost and with greater ease, speed and safety.

The overburden has been left in a more thoroughly shattered condition and all danger from missed holes has been obviated.

The thoroughly-shattered overburden means easy digging, which has made larger dippers possible. This in turn has entailed greater yardage, with lower repairs and has rendered possible the removal of thicker cover.

A greater amount of coal has been uncovered and a greater tonnage shipped at less cost. Reduction of operating expense may properly stand for a summation of all that has preceded, for after all is said and done, this is the result most desired. In this case a substantial reduction has been achieved with liquid-oxygen explosives. Second, this explosive prepares the overburden in such a thorough manner as to make the entire sequence of operations easier and cheaper.

Work at this property has demonstrated that L. O. X. is suitable for use in similar stripping operations, quarries and open-pit mining in general.

A duplicate oxygen liquefaction unit was recently placed in operation by the Chile Exploration Co. of Chuquicamata, Chile.

Factors in Gas Temperatures

The average temperature of the gases in a boiler furnace depends upon the following factors: (1) The calorific value of the fuel; (2) the rate of combustion; (3) the heat capacity of the products of combustion; and (4) the area of exposed heat-absorbing surface.

Other factors remaining constant, the introduction of additional radiant-heat absorbing surface into a furnace must lower the mean temperature of the furnace gases. However, it does not follow that the temperatures of all zones in the furnace decrease to the same extent. The effect of the increased rate of heat absorption on the temperature of a given zone depends upon its position relative to the heat-absorbing surface and the transparency or opacity of the intervening gases.—*Ralph A. Sherman, Assistant Physicist, U. S. Bureau of Mines, Pittsburgh, Pa.*

Ten Years Ago in Coal Age— April 7, 1917

“Successful Colliery Management,” by H. M. Crankshaw, describes operation and management at Lansford breaker of Lehigh Coal and Navigation Co.

Win M. Chance, in article entitled “Use of Mine Water as Boiler Feed,” discusses neutralization and use of acid mine water in installation in anthracite region.

“Blue Diamond Coal Co.’s plant at Cardiff, Ky.” by H. Reisser, details steps taken to reduce breakage of coal and formation of dust, and to improve quality of product.

James Ashworth’s article, “Development in Safety Lamps,” discusses principles involved and qualities of each of the several types described.

LABOR SITUATION

One hundred breaker boys at the Coal Brook colliery, Carbondale, Pa., in violation of contract, strike for increase of 2 cents an hour: 1,500 men likely to be thrown out of work.

I. W. W. leaders active in towns between Scranton and Wilkes-Barre, Pa. Campaigning for new members, they employ the slogan “Three fives” meaning “Five hours a day, five days a week and five dollars a day.”

Operators’ Association of Central Pennsylvania voluntarily grants the miners a 10 per cent bonus. But district officers, in defiance of the wishes of the United Mine Workers’ leaders, hold special convention at Du Bois and demand 33½ per cent increase. In reply, operators state that the voluntary increase has added \$400,000 to \$500,000 to their monthly pay-roll and that, therefore, they do not feel that they should grant a special conference asked by 60 union locals in district.

MARKETS

Anthracite.—Due to unexpected discounts and increases of all descriptions, to readjustments in freight rates and to sudden acute turn of our foreign relations as regards the World War, uncertainty and confusion rule generally in both wholesale and retail markets. In general, heavy demand and higher prices prevail but are lower f.o.b. New York tidewater where most sellers are granting usual 50 cents per ton seasonal discount. Egg quoted at \$4.95@5.15; stove and nut, \$5.20@5.45; pea, \$4.30@4.50; buckwheat, \$4@4.25; rice, \$3.50@3.75; barely, \$2.65@3.

Bituminous.—There is a further easing up in prices due to a tendency on the part of buyers to go slower, an improvement in transportation facilities, and a growing feeling that bottom of present decline has not yet been reached. Commandeering of large proportion of coastwise shipping facilities and influence of World War tend, however, to make situation tense. Average price of 12 representative bituminous coals for week ending April 7 is \$4.07@4.36 per net ton f.o.b. mines. Prices vary from \$5.75@6 for Pocahontas and New River, to \$2.95@3.05 for Williamson and Franklin Co., Ill., mine-run and screenings.

Decline Characterizes Illinois Production

During the Past 25 Years Southern Illinois Has Forged to the Front as a Producer, Whereas the Other Fields of the State Have Declined or Barely Held Their Own with Difficulty

By Cecil W. Smith

Assistant General Manager, O'Gara Coal Co., Chicago, Ill.

COAL PRODUCTION in Illinois comes from roughly eleven separate fields. This division is mainly the result of the different freight rates to competitive points from each producing locality. With two or three exceptions there is little variation in the quality of coal from the different regions or districts. The two outstanding departures from this general rule are the Murphysboro and Southern Illinois fields, where the quality of the coal is much higher than that from other districts in the state.

The location and extent of these various fields are shown in Fig. 1. Their productions in tons from 1901 to 1925 as incorporated in the reports of the Illinois State Mining Board for the years ending June 30 are set forth in Table I.

Table II shows the productions of the separate fields by years in the percentages of the total state output. These figures reveal the changes which have taken place from 1901 to 1925. These percentages are shown graphically in Fig. 2.

These production curves illustrate some striking facts concerning Illinois coal output. The Wilmington, Northern Illinois and Rock Island fields, once the leading producers of the state and the most favorably situated, have declined rapidly during the period under consideration. At present these regions are apparently producing only enough coal to satisfy their local mar-

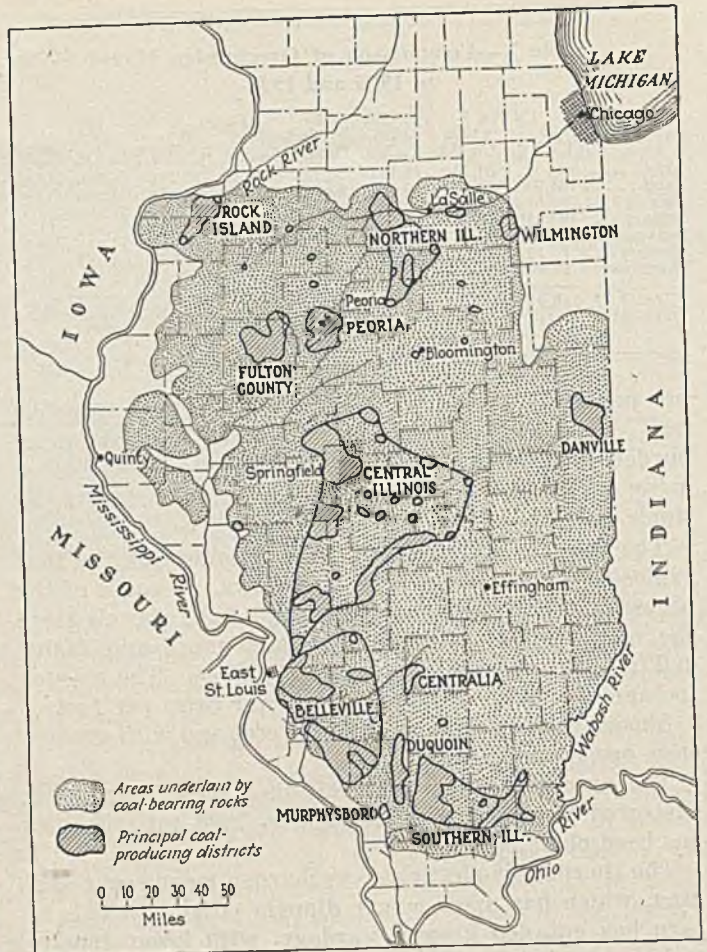


Fig. 1—Coal Map of Illinois

When this map is studied in connection with Tables I and II a clear idea may be gained of what is going on in these several coal fields.

kets. The Danville and Fulton-Peoria fields since 1904 steadily lost position until 1923, when the development of stripping operations again increased their outputs. The Central Illinois field has consistently maintained its position as a producer during this period. A study of the tonnage from this district would reveal, however, that this position has been maintained by the industrial mines and that the commercial operations have steadily lost ground.

The Belleville or "Standard" field increased its per-

Table I—Illinois Production in Tons by Districts

(From the Annual Reports of the State Mining Board)

Production for Year Ending June 30	Wilmington Field	Northern Illinois Field	Rock Island Field	Fulton Peoria Field	Danville Field	Central Illinois Field	Belleville (Standard) Field	Centralia Field	Duquoin Field	Murphysboro Field	Southern Illinois Field	Entire State
1901	1,734,637	3,904,529	730,137	1,695,814	2,003,780	6,924,583	5,567,765	829,326	690,622	633,743	1,820,343	26,635,319
1902	1,835,214	4,176,550	816,053	2,088,718	2,552,438	7,931,980	6,115,162	881,821	647,948	673,341	2,302,075	30,021,300
1903	1,871,096	4,240,615	878,419	2,338,781	2,893,233	9,323,825	7,246,948	1,002,047	822,603	703,349	3,134,484	34,955,400
1904	1,677,126	4,197,133	862,642	2,664,486	3,120,082	9,732,823	8,842,919	1,083,734	871,773	579,325	3,445,854	37,077,897
1905	1,699,954	4,121,339	799,509	2,765,464	2,623,925	9,620,397	8,674,136	1,086,350	887,214	514,910	4,490,266	37,667,877
1906	1,622,038	3,851,591	700,752	2,834,375	2,016,135	10,440,056	9,385,541	826,280	1,167,166	429,600	5,044,047	38,317,581
1907	1,823,174	4,427,764	712,682	3,380,996	3,020,724	12,929,838	10,670,577	1,084,783	1,425,772	371,208	7,950,553	47,922,452
1908	1,655,666	4,404,804	641,377	3,537,608	2,664,733	13,508,862	10,688,500	954,925	1,283,212	382,597	9,650,755	49,163,710
1909	1,652,088	4,489,442	595,860	3,332,008	2,221,914	13,698,562	9,245,364	1,096,847	1,158,016	430,277	11,243,332	48,717,853
1910	1,313,244	3,837,751	509,960	3,188,245	2,033,467	13,681,890	10,489,986	1,000,402	1,000,402	445,411	10,908,553	50,165,099
1911	822,630	3,621,351	486,457	3,270,380	3,270,751	13,473,708	12,065,641	1,134,377	826,498	418,694	15,319,247	57,514,240
1912	1,007,074	4,634,406	502,077	3,980,851	3,374,443	15,241,919	10,556,661	1,356,908	1,018,426	510,778	17,595,660	61,846,204
1913	647,240	4,802,226	541,096	4,163,123	3,510,661	16,618,977	11,346,789	1,388,996	1,164,020	517,116	18,312,520	60,715,795
1914	633,650	4,155,321	506,359	5,878,743	2,983,591	15,962,253	10,755,432	1,426,182	1,547,659	551,294	18,534,914	57,601,694
1915	573,508	3,695,789	467,833	5,337,173	2,061,535	15,989,029	8,967,342	1,387,519	1,862,477	545,575	18,534,914	57,601,694
1916	537,823	3,740,627	439,405	5,739,672	2,608,815	16,734,348	10,167,620	1,461,437	2,151,298	517,119	21,575,366	63,673,537
1917	644,932	3,911,959	376,071	4,851,442	3,299,419	21,494,390	14,322,830	1,794,133	2,019,494	505,161	25,763,156	78,983,527
1918	608,830	3,743,292	438,729	4,925,174	3,971,330	24,477,067	17,374,524	1,841,722	2,347,065	539,697	29,712,239	89,979,469
1919	381,384	2,900,767	317,221	3,662,382	3,299,446	19,827,358	13,968,984	1,513,258	2,376,906	504,768	26,347,310	75,099,874
1920	435,540	2,717,553	306,790	4,389,359	3,248,946	20,408,187	12,608,086	1,460,004	2,122,145	409,995	25,817,138	73,920,653
1921	359,595	2,066,338	355,562	4,343,357	3,371,737	21,959,868	14,844,558	1,624,732	2,487,816	459,655	28,248,940	80,121,948
1922	317,497	1,426,235	271,007	3,427,179	3,011,164	17,081,282	11,091,992	1,356,749	2,017,643	376,066	22,900,013	63,276,827
1923	250,730	1,949,673	260,416	4,662,004	3,879,391	20,859,291	12,564,062	1,198,647	2,067,477	285,087	27,537,417	75,514,095
1924	330,018	1,776,670	303,743	4,160,020	3,761,496	20,126,838	11,240,082	784,073	2,534,355	378,513	26,912,857	72,308,665
1925	524,778	1,177,858	313,017	3,624,032	3,551,604	18,275,981	8,680,760	298,911	2,765,849	252,040	26,709,655	66,174,485

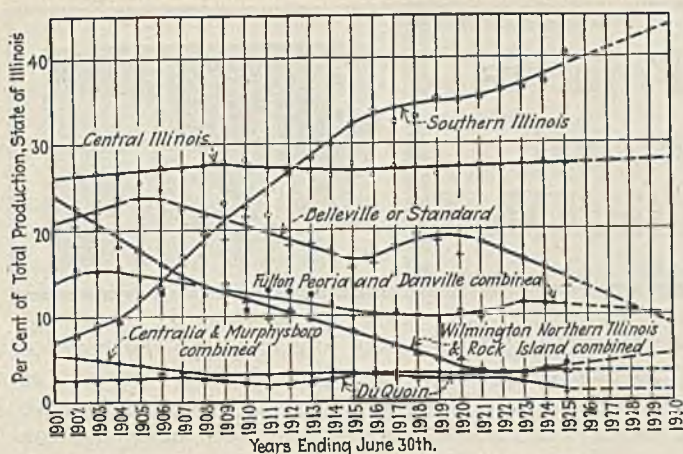


Fig. 2.—Past Production and Future Trends

This shows graphically the output by regions. Note the decided upward trend of the Southern Illinois field and the horizontal or downward slope of the other graphs. These give a fair "line on" what may be expected in the future unless there is a change in the conditions affecting operation.

centage quite rapidly until 1906 when a sharp reaction set in. This loss in position was halted only by the World War and since 1919 the decrease in production from this district has been rapid. How far this descent will continue will depend upon the amount of tonnage in the St. Louis-East St. Louis area which will be retained as local to this district. The Centralia and Murphysboro fields have both declined steadily in importance during the period in question and both have apparently now reached a minimum production which may be considered as governed by local consumption. Since 1901 the Duquoin field has maintained its relative place as compared with other districts and since 1922, its position has been bettered by one industrial mine and several large stripping operations.

The "Southern Illinois" field is the outstanding producer in the entire state. From fifth position in 1901, it had risen to first position by 1913, and from that time on it has been expanding its output at the expense of almost all of the other fields. It is now producing more than 40 per cent of the tonnage of the entire state and this proportion is rapidly increasing.

This graphic study of Illinois coal production indicates that, present conditions and relationships remain-

ing unchanged, the Southern Illinois coal field will continue to increase its production and the remaining fields will diminish in output proportionately. If through wage or other adjustments Illinois is enabled to better meet the competition from other states, all of the producing districts will benefit somewhat, but the Southern Illinois field will profit most from such an arrangement.

Magazine Heaters Run Ten Hours Or More at Low Ratings

For satisfactory service magazine heaters need a good chimney, which is something that is not always provided according to Prof. E. H. Lockwood, of Yale University, addressing the Metropolitan Section of the American Society of Mechanical Engineers in New York City.

"Magazine heaters," he remarked, "possess marked advantage for domestic heating, as they meet the essential requirements of a long firing period without attention. The principle of magazine feed has been used in stoves to a limited extent, but the largest application has been to steam and water boilers in houses. The magazine heater contains more parts and is somewhat more costly than the usual flat-grate type of anthracite furnace. Buckwheat coal is the customary fuel for magazine heaters, the lower cost of the fuel offsetting the higher cost of the equipment.

"The magazine holds enough fuel for about 10 hr. running at full capacity and for longer periods at part capacity. During this time the furnace will operate almost without attention. Failures in magazine heaters have been due mostly to lack of draft; hence it is of great importance to see that an adequate chimney is provided.

TWO WAYS OF REMOVING ASH

"The ash from a magazine heater can be removed in two different ways. The usual plan is to shake the grate until most of the ash has fallen into the ash pit, aided if necessary by a poker from the front door. This method usually does not remove all the ash, but enough to allow the fire to burn for a considerable time without attention, after which the flow of coal down the grate may be checked in spots by local formation of ash.

"Complete removal of ash is a more laborious but more effective way to handle the fire. This must be done when the magazine is empty with plenty of kindling fire. The procedure is to push all the good coal from left to right, leaving only ash and clinker to dump into the ash pit. The second step is to push all the good fuel back on the bare grate, and dump ash and clinker on the opposite side, finally spreading the good fuel over both grates and immediately firing fresh coal into the magazine.

"When the fire is cleaned of ash in the thorough manner just described, the feed will be continuous until the whole magazine is empty with no clogging or formation of obstructing ash. When the grate is on one side only, the same general procedure can be followed by pushing the fuel back and dumping ash and clinker from one half of the grate at one time.

"Only a non-clinkinging fire can be obtained in a magazine heater, for the fuel bed is in constant flow from the magazine throat downward. The clinkinging fire is probably a little more efficient from a combustion viewpoint but it is not permissible in a furnace having magazine feed."

Table II—Production of Illinois Coal Fields

(Shown in Percentages of Total State Production)

Year Ending Jan. 30	Wilmington	Northern Illinois	Rock Island	Fulton, Peoria	Danville	Central Illinois	Belleville	Centralia	DuQuoin	Murphysboro	Southern Illinois
1901	6.6	14.7	2.8	6.4	7.5	26.1	20.9	3.1	2.6	2.4	6.9
1902	6.1	13.9	2.7	7.0	8.5	26.4	20.4	2.9	2.2	2.2	7.7
1903	5.4	12.1	2.6	6.7	8.5	26.6	22.1	2.9	2.3	2.0	9.0
1904	4.6	11.3	2.3	7.2	8.4	26.2	23.8	2.9	2.4	1.6	9.3
1905	4.6	11.0	2.1	7.4	7.0	25.6	23.7	2.9	2.4	1.4	11.9
1906	4.2	10.0	1.8	7.4	5.3	27.3	24.5	2.2	3.0	1.1	13.2
1907	3.8	9.2	1.5	7.1	6.3	27.1	22.3	2.3	3.0	.8	16.6
1908	3.4	8.7	1.3	7.2	5.4	27.4	21.7	1.9	2.6	.8	19.6
1909	3.4	9.1	1.2	6.8	4.5	27.8	18.8	2.2	2.4	.9	22.9
1910	2.7	7.9	1.0	6.5	4.2	28.1	21.5	2.2	2.1	.9	22.9
1911	1.6	7.2	.9	6.5	6.5	26.8	24.1	2.2	1.6	.8	21.8
1912	1.7	8.0	.9	6.9	5.9	26.5	18.3	2.4	1.8	.9	26.7
1913	1.0	7.7	.7	6.7	5.6	26.8	18.3	2.2	1.8	.8	28.4
1914	1.0	6.9	.8	6.4	4.9	26.3	17.7	2.4	2.5	.9	30.2
1915	1.0	6.4	.8	6.1	3.6	27.7	15.6	2.4	3.2	1.0	32.2
1916	.8	5.9	.7	5.9	4.1	26.3	16.0	2.3	3.4	.8	33.8
1917	.8	5.0	.5	6.1	4.2	27.2	18.2	2.3	2.5	.6	32.6
1918	.7	4.1	.5	5.5	4.4	27.2	19.3	2.0	2.6	.6	33.1
1919	.5	3.8	.4	4.9	4.4	26.4	18.6	2.0	3.2	.6	35.2
1920	.6	3.7	.4	5.9	4.4	27.6	17.0	2.0	2.9	.5	35.0
1921	.5	2.6	.4	5.4	4.2	27.4	18.5	2.0	3.1	.6	35.3
1922	.5	2.3	.4	5.4	4.8	27.0	17.5	2.1	3.2	.6	36.2
1923	.3	2.6	.4	6.2	5.1	27.6	16.6	1.6	2.7	.4	36.5
1924	.4	2.5	.4	5.8	5.2	27.8	15.5	1.2	3.5	.5	37.2
1925	.8	1.8	.5	5.5	5.4	27.5	13.1	.4	4.2	.4	40.4



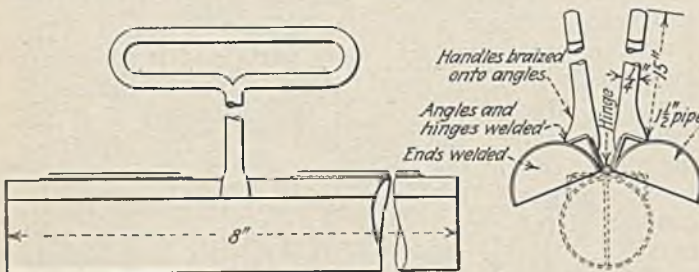
Practical Pointers For Electrical And Mechanical Men



Tongs Simplify Dummy Making

Clay seems to be the most satisfactory stemming material. According to Charles S. Hunter in the *Explosives Service Bulletin* difficulty is often experienced in its use when this material is simply rolled into balls or long dummies. For best results the clay should be made up into paper-covered dummy cartridges.

To facilitate getting the clay into this shape the Montreal Mining Co., of Montreal, Wis., has developed



Tongs That Form Dummy Cartridges of Clay

These tongs are made from a piece of pipe. This is split throughout its length and the two halves hinged together. The handles form a ready means of shaping the clay into a cylindrical shape. They can be made by almost any blacksmith.

a special tongs that has proved highly successful. This device, shown in the accompanying illustration, consists of an 8-in. length of $1\frac{1}{2}$ -in. pipe that is split lengthwise the two pieces being hinged at one edge. Each piece is also fitted with a suitable handle so that the two halves can be opened and shut like a clam shell.

The dummy wrappers are cut in the shape of a trapezoid 10 in. long, $6\frac{1}{2}$ in. wide at one end and $8\frac{1}{2}$ in. wide at the other. A piece of paper so cut is laid on top of a level bed of clay, the tongs, with the jaws wide open are held upright and resting on the paper in a position parallel with its 10-in. edge. The jaws are then pressed down hard and closed. This picks up a mass of clay inside the paper that is $1\frac{1}{2}$ in. in diameter and 8 in. long. The tongs are then opened and the paper and clay removed together. The paper is next wrapped around the clay folding in the straight edge first. Folding down the ends completes the dummy.

This makes a cartridge that is more or less plastic in nature. The paper can be slit and the clay rammed firmly home against the explosive charge. It will be noted from the drawing that the handles of the tongs are together when the mold is fully open. This prevents bending the handles when the mold is forced into the clay. The design is such that the instrument can be made by any ordinary blacksmith.

At the mine where this device was invented one man working $3\frac{1}{2}$ hr. has made 320 dummies including cutting the wrappers, squeezing the clay into the mold and wrapping the paper around it. At this rate he should be able to make 640 dummies in an 8-hr. day, allowing

an hour for filling the clay bin, handling the boxes of completed dummies and the like. As this workman acquires greater skill he will probably be able to make a larger number of these dummies per hour and consequently per shift.

Explanation of Numbers Used on Prints Of Automatic Boards

Abbreviated wiring diagrams of automatic substation switching equipment are rather difficult for maintenance electricians to understand. These practical men often ask why certain numbers are used to designate certain parts of the equipment; why certain numbers are left out; do all manufacturers use the same numbers, and if so what do the numbers mean.

The answers to these questions are found in the Handbook of Standards of the Electric Power Club which is an association of manufacturers of electric power apparatus and control equipment. Practically all manufacturers belong to this organization and therefore its standards are closely followed. The rule dealing with this subject is quoted from the latest edition of the Electric Power Club Handbook of Standards.

"10356 Device Numbers.

1. Each device used in an automatic switching equipment has a device number which is placed adjacent to the device symbol on all wiring diagrams and arrangement drawings.

LIST OF STANDARD DEVICE NUMBERS

2. The following device numbers and their corresponding functions shall be standard for machine equipments: 1, Master element; 2, time delay starting or closing relay; 3, master relay; 4, master contactor; 5, stopping switch; 6, starting contactor or breaker; 7, polarized motor relay; 8, control power switch; 9, field reversing relay; 10, change over switch; 11, control power transformer; 12, overspeed limit device; 13, synchronous speed device; 14, underspeed device; 15, reserved for future application; 16, battery charging device; 17, series field shunting contactor or breaker; 18, accelerating relay or contactor; 19, 20 and 21, reserved for future application; 22, equalizer contactor or breaker; 23, 24 and 25, reserved for future application; 26, transformer or auto transformer or compensator temperature relay; 27, alternating current undervoltage relay; 28, resistor thermal relay; 29, isolating contactor or breaker; 30, annunciator lock-out relay; 31, field flashing contactor; 32, direct current reverse current relay; 33, limit switch on waterwheel gate; 34, motor operated master switch; 35, brush operating mechanism; 36, polarity relay; 37, undercurrent relay; 38, bearing thermal relay; 39, field killing contactor; 40, alternating current machine field relay; 41, field contactor; 42, run-

ning contactor or breaker; 43, transfer switch or relay; 44, emergency starting relay or contactor; 45, direct current overvoltage relay; 46, reverse phase or phase balance relay; 47, single or reverse phase voltage relay; 48, starting protective relay; 49, alternating current thermal relay; 50, short circuit selective relay; 51, alternating current overcurrent relay; 52, oil circuit breaker and mechanism; 53 exciter relay; 54, high speed circuit breaker; 55, power factor relay; 56, direct current reverse power and underload relay; 57, current regulating relay; 58, voltage regulating relay; 59, alternating current overvoltage relay; 60, voltage equalizing relay; 61, current balance relay; 62, time delay stopping or opening relay; 63, oil, water or air pressure relay; 64, grounding protective relay; 65, governor solenoid; 66, notching relay; 67, alternating current reverse power relay; 68, direct current thermal relay; 69, reserved for future application; 70, motor operated field rheostat; 71, direct current line emergency circuit breaker or contactor; 72, direct current line contactor or circuit breaker; 73, 74 and 75, load limiting resistor shunting contactor or circuit breaker; 76, 77 and 78, direct current overcurrent relay; 79, alternating current reclosing relay; 80, direct current undervoltage relay; 81, locking-out voltage relay; 82, direct current reclosing relay; 83, selective control relay; 84, generator relay; 85, commutation control relay; 86, locking-out current relay; 87, differential current relay; 88, auxiliary motor contactor; 89, direct current line switch; 90, voltage regulator; 91, direct current voltage directional relay; 92, synchronizing motor; 93, field changing relay or contactor; 94, tripping or trip free contactor; 95, 96, 97, 98 and 99, special for specific requisitions.

TWO OTHER SIMILAR SERIES

3. A similar series of numbers starting with 101 instead of 1 shall be used for the same functions applying to feeder equipment, and a similar series of numbers starting with 201 instead of 1 shall be used for the same functions applying to supervisory control equipment.

4. The term "hand reset" shall be added wherever it applies.

5. Auxiliary relays shall be indicated as X, Y, Z.

6. Raising or lowering relays shall be indicated by adding R or L, and tripping relays by adding T to the device function numbers."

The standards above quoted were adopted Oct. 10, 1924, and amended Apr. 23, 1925. This information is a "key" to the wiring diagrams that have puzzled many electricians when having their first experience with automatic substations.

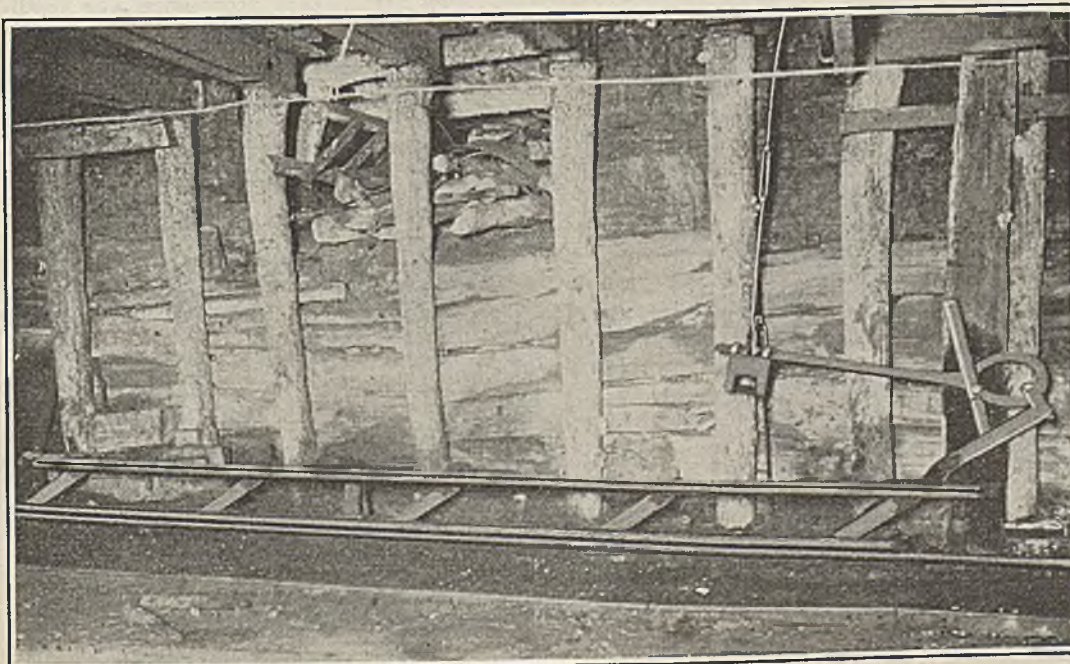
"Spragger" Squeezes Wheel Treads Between Angle Irons

Sprags stuck between the spokes of car wheels are effective but the evident disadvantages label their regular use as an inefficient practice. On the gravity bottom of the Great Western Coal Co.'s shaft mine, near Des Moines, Ia., the movements of the loaded and empty cars are controlled by wheel-squeezing devices actuated by wire ropes extending to the shaft.

One of the several "spraggers" in use is shown in the accompanying photograph. This device consists of two 2½ x 3-in. angles 16 ft. long connected by five parallel bars. The lower angle is fastened to a 3-in. plank and the two are used in place of a section of rail in the track.

The retarding or holding of cars is effected by squeezing the wheel treads between the two 16-ft. angle irons. Movement is imparted to the upper angle by the action of a weighted lever having a peculiar loop at the fulcrum and working in combination with a second lever that is a continuation of one of the parallel bars. The upper angle iron moves in the direction of car travel at the same time that it moves downward in squeezing the wheel.

The device is held open by the weight on the lever and is tightened when this lever is lifted by pulling a wire rope which extends to the shaft. Where the angle irons wear against the wheel treads they are reinforced by steel wearing strips. These car "spraggers" seem to operate with entire satisfaction in the Great Western mine.



On Empty Side of Shaft

This shows the upper angle iron in the open position, that is, just high enough so that it will not rub on the wheel treads. To the left of the center is a vertical brace. The back of the upper angle iron rests against this brace which resists a tendency for the angle to be forced sidewise. Raising the weighted lever swings the upper angle iron to the right and downward.



News Of the Industry



Efforts to End Tie-up Gain Impetus; Negative Progress in Central Field; Ohio Miners Reject Parley Proposal

Efforts to end the deadlock which has thrown 185,000 men out of employment and shut down mines in the Central Competitive Field, Iowa and the Southwest which last month were producing approximately 4,250,000 tons every week have gained fresh momentum in the past few days.

Outside of the strip-pit mines of Indiana, however, actual developments since the policy committee of the United Mine Workers opened the way for district negotiations in the four-state group have been largely negative.

In Ohio operators and miners split over the question of what should be considered at a district conference and the chances of an early meeting are dubious.

Indiana stripping interests will meet with district union officials at Terre Haute, Ind., today, but no call has been issued for a joint conference of miners and shaft-mine producers.

A newspaper report that Illinois operators and miners would confer at St. Louis, Mo., tomorrow has been denied by Rice Miller, president of the Illinois Coal Operators' Association. "No arrangements have been made for any meeting with the miners," he told *Coal Age*.

Governor Hammill of Iowa has announced that he will endeavor to get the operators and miners of his state together at a conference this week.

In the Central Competitive Field proper the most dramatic development of the week was the open-shop announcement of the Pittsburgh Terminal Coal Corporation. It had been known for several days that the union proposed to concentrate its forces in western Pennsylvania for an intensive drive against the Pittsburgh Coal Co., on the theory that, if it could seriously cripple the operations of that company, now regarded in labor circles as the arch-foe of the United Mine Workers, opposition of other operators could be more easily overcome.

Where the Pittsburgh Terminal Coal Corporation, the second largest commercial producer in the district, would stand in the fight, however, was somewhat of a mystery. Conflicting rumors as to the policy it would follow had been flying around ever since the Miami conference, where Horace F. Baker, president of the company, had declared that Pittsburgh operators must be given a

wage scale which would put them on a competitive basis with the Pittsburgh Coal Co.

Although union officials were fearful that a definite break would come, they denied any authoritative knowledge of the stand to be taken up until the time the Pittsburgh Terminal Coal Corporation actually posted the notices inviting its men to accept a lower wage scale. These notices, dated April 1, read as follows:

This company has kept its wage agreement with the miners. We regret exceedingly that we have been unable to make a new wage agreement, effective April 1, 1927, as the miners' representatives would not accept anything but a renewal of the Jacksonville agreement.

We honestly believe it would be suicidal for the company to continue working under the Jacksonville agreement. The last three years have shown that no company in this district can profitably mine coal and pay the Jacksonville scale in competition with the lower wages now paid and that have for some time been paid in this and adjoining states. A wage scale that the company can live under is just as necessary for success as a good wage for the workers.

If we are to run our mines in competition with the prices made by other companies in this and adjoining states, there must be a downward revision of the Jacksonville scale. We believe that a large majority of you have already reached the same conclusion.

We are ready and willing to pay the rates set out below and we expect and believe our employees will see the justice of our position and the fairness of the rates offered.

The rates named, compared with rates posted by the Pittsburgh Coal Co. on Jan. 18, 1927, are:

Classes of Labor	Pittsburgh Terminal Coal Corporation	
	Terminal Coal Co.	Pittsburgh Coal Co.
Rates per Day		
Wiremen	\$6.75	\$6.00
Wiremen's helpers, trackmen's helpers	6.00	5.75
Timbermen	6.00	6.00
Timbermen's helpers	5.75	5.75
Trackmen, drivers, snappers	6.50	6.00
Pumpers, pipemen, water haulers, bratticemen	6.00	*
Motormen	6.75	6.10
Trappers	3.00	3.50
Bottom cagers	7.00	*
Other bottom men	6.00	*
All other inside labor	5.50	5.75
Dumpers	6.00	5.40
Trimmers	5.00	5.15
Car droppers	5.00	*
Car cleaners	4.50	5.00
Other outside labor	4.50	*
Slate pickers	3.00	*
Rates per ton		
Drilling by hand and loading in rooms	.70	.62@.65
Cutting in rooms and pillars, etc.	.15	.12@.144
Pick mining	1.01	.83@.94

*Not specified.

In all probability it will be several

days before any real attempt will be made to open up any of the Terminal Corporation mines. When the campaign is actually started, however, it is reported that the Coverdale mine will be the first of the group to start. As soon as operations there are on a basis satisfactory to the company, another mine will be opened. This was the line of campaign followed by the Pittsburgh Coal Co. when it broke with the union in the summer of 1925. That company now has eighteen mines running on the open-shop plan.

About the time the news of the decision of the Pittsburgh Terminal Corporation was seeping out, Ohio operators, at a meeting in Toledo, Ohio, were framing their invitation to the miners of district 6 to meet with them at Columbus today to discuss the negotiation of a continuously competitive wage scale. The invitation, signed by S. H. Robbins, president of the Ohio Coal Operators' Association, and addressed to Lee Hall, president of district 6, United Mine Workers, read:

Our executive committee, meeting today in Toledo, understanding that you have been given authority by your international organization to enter into a district wage scale for Ohio, have instructed me to invite you and the accredited representatives of the Ohio miners to meet with the accredited representatives of this association at the Deshler Hotel, Columbus, Ohio, on April 7, 1927, at 2 p.m., for the purpose of negotiating a scale of wages for the mines of Ohio represented by this association which will place them upon a continuously competitive basis.

Mr. Hall, who at first stated that the invitation would be accepted by the miners, later qualified this declaration by saying that acceptance was conditional upon the operators' agreeing to a broadening of the scope of the conference. His second thought on the subject was that the operators' invitation was so worded that it committed the miners to a consideration solely of a wage reduction.

Mr. Robbins, discussing the situation with a representative of the Associated Press at Cleveland, said that the producers would offer the miners a \$5 scale. Mr. Hall, from his office in Columbus, retorted that the district organization was without authority to accept any wage agreement lower than the Jacksonville scale. He further expressed the opinion that Ohio operators could reduce production costs without disturbing wage scales.

After these informal interchanges of opinion both sides viewed the chances of an early conference as remote. "I see no possibility of a conference this week between Ohio miners and operators," Mr. Robbins told *Coal Age* on Monday night. "The miners are asking a conference to negotiate a wage scale without any reduction in wages. The

operators are asking a conference to negotiate a competitive wage scale. The wide difference makes the possibility of a conference very improbable."

Just how effective and widespread the suspension will be will not be known for several days. Union officials are talking optimistically of the inroads they will make upon the strength of the non-union fields and also are emphasizing the gains they have made in persuading individual operators in the Central Competitive Field and in the outlying districts to continue at work under the Jacksonville scale pending the negotiation of a new agreement. Spokesmen for the operators minimize the defections in the four-state group and insist that the tonnage that has accepted the union's offer is small.

On the eve of the suspension Harry Fishwick, president of district 12, asserted that between twenty and thirty operations in Illinois would continue to run. The more important of these, it was said, were in the northern part of the state. Included in this group were three companies not members of the Illinois Coal Operators' Association, with five active mines having a daily output of approximately 16,000 tons.

U. S. Fuel Co. to Operate

The most important member of this group is the United States Fuel Co. It was announced that this subsidiary of the United States Steel Corporation would reopen two mines in Vermillion County just as soon as some of the stockpiles built up before April 1 had been reduced. Operations of this same company in southern Illinois and in Indiana, down for nearly two years, would not be started up again, it was said.

The United Electric Coal Cos., with a daily output of 4,000 tons from two strip pits at Cuba and Danville, Ill., also was slated to continue operations. The third member of the group is the Hegler Zinc Co., with mines at La Salle. The Hegler and United States Fuel Co. operations, of course, are captive mines. Most of the tonnage from the Cuba and Danville pits is reported to be under contract.

Operations of the National Mining Co. in the Pittsburgh district have been closed and no statement has been made as to the future policy of this subsidiary of the Steel Corporation. Patrick Fagan, president of district 5, United Mine Workers, discussing the situation last Saturday, said that a number of small operations in western Pennsylvania had agreed to continue at work.

According to a report from Bellaire, Ohio, five companies employing 300 men signed up on the union terms on April 2. The companies named were the Schick, Progressive, Sunnyside, Meister and W. H. Kasley Coal companies. In line with past policy, it is considered likely that a number of small captive mines, particularly those connected with brick kilns, will continue at work. At the San Toy mine of the Sunday Creek Co., the men were invited to accept a competitive scale with the promise of steady work, but the invitation was ignored.

The first few days of the suspension gave no indication that the disaffection

Roads Make New Record For January Traffic

Freight traffic handled by the Class 1 railroads of the United States in January was the greatest for that month ever reported, totaling 39,223,400,000 net ton miles, which exceeded by 1,516,772,000 net ton miles, or 4 per cent, the previous record made in January, 1923. It also exceeded by 1,547,763,000 net ton miles, or 4.1 per cent, that for January, 1926.

In the Eastern district there was an increase of 6.9 per cent in freight traffic volume over January last year; the Southern district showed a decrease of 3.1 per cent while the Western district reported an increase of 3.2 per cent.

in the Pittsburgh area would spread to other parts of the Pennsylvania field. A few men failed to report for work in the coke region, but, generally speaking, operations were normal in Fayette and Greene counties, where the largest producing interests, controlled by the United States Steel Corporation, pay the Jacksonville scale or better.

Open-shop mines in Washington County are reported to be operating on a normal basis. On April 1 the Bethlehem Mines Corporation said that the number of men at work in its Ellsworth division was only 5 per cent less than on the preceding day. All union mines are down, but, with few exceptions, their running time had been highly intermittent prior to April 1.

The outstanding exception to this broken time was the Vesta Coal Co. plants at California. There are rumors that this company, which has a tremendous quantity of coal in storage, will not reopen until a lower wage scale is obtainable. Open-shop producers say that they are receiving an increasing number of applications from miners thrown out of employment by the suspension in the union sections.

Union claims of success in encouraging desertions from the forces of the Pittsburgh Coal Co., following a demonstration staged at Library last Friday, are denied by spokesmen for the company. The latter state that 4,785 men reported for work on March 31 and produced 15,231 tons. The next day the working force dropped to 4,080 and the output to 15,008 tons. On April 2 there were 4,184 men at work. On Monday of this week the number rose to 4,329. The company also reported that production for the week ended April 2, including two days of the strike, was 90,355 tons. The company in the preceding week had reported 116,535 tons.

The Friday demonstration at Montour No. 10 was entirely peaceful and union officers have pledged a strict observance of law and order in their campaign. County officials, however, are seeking to check assemblages as a preventive to trouble. The sheriff of Allegheny County has issued orders limiting pickets to eight men "at places where there is danger of a riot," for-

bidding more than three persons to congregate on a public highway and restricting mass meetings. Union officials are protesting the new regulations.

Following the refusal of the operators to meet with union representatives, Van A. Bittner, chief international representative, and J. L. Studdard, president of district 31, United Mine Workers, issued a strike call in northern West Virginia. Operators decline to take the action seriously, pointing to the failure of similar calls in 1925 and 1926. It was admitted, however, that 25 per cent of the men in Monongalia County did not report for work the first few days of the month. This absenteeism, according to the operators, is customary after a strike call as many men wish to avoid trouble. In a few days, they said, most of the men would return to work. Mr. Bittner, on the other hand, declared that the strike was fully effective.

The chances of any disturbance in western Kentucky are discounted by both sides. In the past few weeks union organizers have held a number of meetings. Union officials have not abandoned their attempts to persuade the operators to negotiate an agreement, but privately admit there is little possibility of any tie-up until coal demand has improved. Sporadic trouble at individual mines over discipline, however, is expected as there have been a number of small strikes during the past six months.

Deadlock Unbroken in Southwest

The Southwestern deadlock is unbroken. Many of the operators in that section broke with the union during 1925 and these mines are unaffected by the suspension. The Home Coal Co., Macon, Mo., heretofore a union mine, has announced that it will go on a profit-sharing basis. "Our day work will be done by stockholders and our tonnage work will be paid on terms of the Jacksonville scale," says the company. The mine employs 50 to 100 men.

Association operators challenge the claim of the union that the Iowa independent producers who are continuing at work represent any substantial part of the productive capacity of the state. The Iowa Coal Operators' Association declares its membership embraces 90 per cent of the output. The claim that the mines now aligned with the union can contribute 20 per cent of the Iowa tonnage is vigorously denied.

In the meantime the public at large is showing no excitement over the situation. Official Washington preserves a Coolidge calm. Business and transportation agencies reassure the consumer with reports of stocks above ground and capacity of the mines now working. The nearest approach to outside suggestion for settlement comes from the Federal Council of Churches of Christ in America.

That agency, in a report of its department of research and education, abstracted in another column, points to the development of improved relationships in the railroad labor world as a guide for a constructive solution of the problems of the unionized coal industry. There, it claims, it has been demonstrated that co-operation between unions and management can effect

great economies through the elimination of waste, remodeling technical procedure, improving facilities and reducing unemployment.

"Those who inaugurated the movement had sufficient wit to set the men and management to think about something other than grievances. Every incentive is present for the men and management in the union coal fields to work along similar lines. The principles on which the movement in the railway industry is founded open a vista of unlimited possibilities."

Non-union mines have a potential productive capacity of 9,764,168 tons weekly, according to the car service division of the American Railway Association, which says:

"The average weekly production of bituminous coal of both union and non-union mines for the past four years for the period from April 1 to Sept. 30 amounted to 9,401,000 tons. This included 1926, when there was a heavy export movement of bituminous coal due to the strike of British miners.

"Bituminous coal actually produced by mines operated by non-union labor for the week ended Dec. 4, 1926, amounted to 8,261,852 tons. During that week non-union mines having a car rating per week equal to 1,502,316 tons were not in operation. With those mines in operation the potential production would be 9,764,168 tons in excess of the total weekly average for the past four years.

"The survey of the car service division shows that the car supply and transportation service will be wholly adequate to take care of any output that may be produced."

Chemists to Study Coal

The American Chemical Society will hold its 73d meeting at Richmond, Va., from April 11 to 16. The division of gas and fuel chemistry will hold two sessions on Wednesday, April 13, at which several papers of interest to coal men will be presented. Among the authors are Prof. D. J. Demorest of Ohio State University, who will read a paper on the gas-making properties of Ohio coals; Dr. S. W. Parr of the University of Illinois will discuss the reactivity of coke; G. W. Jones and G. St. J. Perrott will give a paper entitled "Oxygen Required for the Propagation of Hydrogen, Carbon Monoxide and Methane Flames"; G. St. J. Perrott and D. B. Gawthrop will discuss an apparatus for studying the ignition process of inflammable gas-air mixtures by explosives, and S. P. Burke and P. S. Roller will present data on equilibria in the combustion of methane.

Reduced railroad fares will be in effect and, in addition to the session mentioned above, there will be several others that also should be of interest to those in the coal industry. Inspection trips to near-by industrial plants also are scheduled.

First-Aid Meet Planned.—The annual first-aid contest for the championship of Pennsylvania will be held at the Ebensburg Fair Grounds on July 9. The contest will be open to all mining and industrial teams.



Edward J. Mehren

Vice-president and chairman of editorial board, McGraw-Hill Publishing Co.

E. J. Mehren Will Cover World Economic Conference

In order to give American industrialists and engineers first-hand information on the deliberations and conclusions of the International Economic Conference at Geneva, the McGraw-Hill Publishing Company is sending Edward J. Mehren, one of its vice-presidents, to the meeting. He will sail on the same ship with the American delegates and experts on April 20. Mr. Mehren will report his observations in *Coal Age*. He will also cover in articles in this paper summaries of the reviews, made at the conference, of the economic positions of the principal countries of the world.

Mr. Mehren has a broad knowledge of American industry and engineering. Joining the staff of *Engineering Record* more than 20 years ago, he became in turn editor of *Engineering News-Record* and vice-president and chairman of the editorial board of the McGraw-Hill Publishing Co. In his editorial travels, he has covered engineering and industrial developments in every part of the United States, in eastern Canada and in the leading countries of western Europe. His general connection with the McGraw-Hill papers and contact with the fields they represent have given him a broad knowledge of American industrial and engineering problems and methods. This will be the background he takes to Geneva.

In addition to his experience gained through his editorial and publishing work, Mr. Mehren was at one time manager of the Emerson Co. and was associated with Harrington Emerson in the height of the "efficiency" movement, thus obtaining an intimate insight into management technique. He was one of the organizers of the National Association of Corporation Schools and of the war-time Highway Industries Association. He has been a director of the New York Building Congress, and is a director of the American Arbitration Association, and chairman of the arbitration committee of the American Society of Civil Engineers.

Budget Studies Emphasize Isolation of Mining

Government bureaus now are busy preparing their preliminary estimates for the budget to cover the work of the fiscal year beginning July 1, 1928. So many safeguards have been thrown around the U. S. Treasury that appropriations are difficult to get. Evidence must be overwhelming that the public will benefit by any proposed expenditure. The necessary showing can be made only by the presentation of facts and figures sufficient to substantiate the claims being made.

Experience over a long period of years has been that appropriations have gone to those industries and activities which have come forward with strong pleas and abundant proof that the taxpayers' money expended to help them will redound to the profit of the whole people.

Lack of adequate appropriations for the mining industry is thought to be chargeable in part to the absence of definite evidence that the industry really is anxious to have such assistance. It is true that the American Mining Congress has been a consistent pleader for greater recognition of the mining industry by the federal government, but officials realize that the mining industry generally has not been particularly generous or enthusiastic in its support of that organization.

Senator Oddie, chairman of the Mines and Mining Committee of the Senate, expects to do what he can this summer to arouse the industry to a general effort to obtain from the government that service which can be done only by a central agency in which all have confidence. He will point out that it is imperative that officials in Washington be impressed with the interest of the industry in this matter at this time when the budget is in course of formation. To get departmental estimates after the budget has been made up or to override the budget with amendments to appropriation bills present additional difficulties with lessened chances for success.

Michigan copper producers are co-operating wholeheartedly with the Bureau of Mines in the studies now being made in the region where their mines are located, Dr. W. R. Crane reports. Dr. Crane, of the Bureau's technical staff, is making a study of rock pressures. Those studies already have proven of practical value and are being extended to include a part of the iron country. A. W. Fahrwald, the chief technician at the Moscow (Idaho) station, has been assigned to Michigan for work this summer. He will study smelting methods with particular reference to classification of ores.

Influential Arizona operators have signified their intention to consider the manufacture of elemental sulphur from smelter fumes. The Bureau of Mines expects to co-operate in these studies.

Observations are being made by the Bureau of Mines at the Moffatt tunnel in connection with the study it will make of the ventilation problem there. Data being collected now will be compared with that which will be gathered as the tunnel takes on finished form.

Suspension at Bituminous Coal Mines Is More Widespread Than Expected In Washington; Shortage Not Feared

By Paul Wooton

Washington Correspondent of *Coal Age*

When the curtain rose on the bituminous strike of 1927 observers in Washington saw a more widespread suspension than they had anticipated. The union's effort to conclude interim agreements with those who will continue the Jacksonville scale has not been the success which for a time seemed likely. In Wyoming, Montana and Washington it worked, but those states are in a section far removed from the center of non-union production. The plan seems also to have worked in central Pennsylvania, but it is suspected in that case it has played into the hands of the operators. There being no strike at union mines the danger of a sympathetic demonstration in the non-union mines of the district, particularly at those that have broken away during the last two years, is much less.

While this suspension is not as great as in 1922, attention is called to the fact that it is as widespread as some of the big demonstrations before the war, such as those of 1906 and 1910, for example. The fact, however, that the conflict covers a wide area gives rise to no apprehension of a coal shortage. Union mines with an aggregate output of not less than 700,000 tons have agreed to continue the Jacksonville scale. Added to the proven non-union tonnage it all but equals the current rate of consumption. With more coal in storage than at any other previous time any shortage that may develop is so far away that little consideration is being given to it.

Developments apparently are unfavorable to the strategy of the union in the effort to pinch off Pittsburgh and eastern Ohio by signing up the fields on all sides. It is recognized that the fighting chances of the Pittsburgh operators are improved by the wide zone of conflict.

Some interpret the eleventh-hour resolutions of the miners' policy committee as a sign of weakness. These resolutions make official the understanding which had prevailed before that the union would sign an agreement with any individual operator in any district of the Central Competitive Field. This method, which was used with signal success by President Lewis in 1922, seems much less promising now. In 1922 prices were rising, profits were large and the demand for labor in

non-union fields already had begun to force an increase in wages. The whole industry was ready to freeze, as it were, on the union scale and when a few centers crystallized it caused the entire mass to solidify.

The situation now is very different. The open market value of the miner's service is far below the union scale. Prices are not likely to increase greatly. As a result none will be tempted to hire men at more than the current level of wages, as shown by the rates in the non-union fields.

It is believed here that the extent and seriousness of the strike can be judged very promptly—just as soon as the real facts are known as to the number of non-union miners that have heeded the call for a sympathetic strike.

The White House announcement that the President will observe a hands-off policy comes as no surprise. The success of that attitude during the anthracite strike and the failure of Congress to grant specific emergency powers to the executive make it practically certain that the industry will be left to settle its own quarrel.

Council of Churches Offers Strike Solution

A way to an eventual solution of the disagreement between union miners and producers, according to the department of research and education of the Federal Council of Churches of Christ in America, may be found in the example set by the railroads. The suggestion is contained in a report on a study of conditions in the coal industry which led to the present strike, made public April 2.

"In the railroad industry," the report says, "it is being demonstrated that unions and management can effect great economies by a co-operation which calls for new attitudes and new methods on both sides. The emphasis on the elimination of waste, remodeling technical procedure, improvements of facilities, and stabilization of employment has proved to be 'good business' for all concerned.

"In a greatly overdeveloped industry, the units of which have widely varying costs, competition is bound to be strenuous," it remarks. "The investors in each mine prefer to get something on their investment rather than nothing. The force of this motive is frequently so strong that the mines are kept running at a loss over a considerable period of time, rather than shut them down and entail a greater loss.

"Nor is this severe tendency limited to the industry itself," the report says.

"The desire of the public to obtain its coal at the lowest possible price, regardless of the conditions under which the miners work and of the

waste of resources incident to competition, has been largely responsible for the neglect to formulate and apply a wiser policy. The business community regards low wages, unfavorable working conditions, overdevelopment of mining and waste of resources as incidental, if they occur because of the necessity of meeting competition. As a result, the competitive pace is set by those who are most unscrupulous or most hard pressed to make earnings on their investment. The natural result is waste of resources and strife between employers and employees over the division of earnings, because they are both hard pressed to maintain an existence. No form of control is present which is co-extensive with the forces that affect both parties."

When conditions make it possible for non-union operators to induce or compel employees to work under whatever conditions they establish, says the report, the only alternatives remaining to the public are either to refuse to purchase their coal or to inaugurate a regulation of the industry which will establish standards of wages, hours and working conditions. The union, however, does not want regulation, the report adds.

"In response to the challenge of the union operators to offer something more constructive," the report continues, "the union has submitted a plan for 'co-operation on an intelligent basis.' The plan involves the retention of the present wage scale for two years."

A lenient attitude pervades the report in dealing with the operators setting aside the Jacksonville agreement because many operators were faced with the alternative of closing their mines or operating a non-union business if they did not set it aside.

"The shift in production which has given the non-union fields the lead serves as the occasion for the recommendation of the union operators that the union agree to a wage scale based upon whatever wage the non-union operators can establish," the report says. "In the past the outcome of compelling employees to accept wages and working conditions imposed upon them by the most unscrupulous employers has been a revolt by the employees and inconvenience to the public. The precedent is probably significant.

"It is difficult to see how the operators and miners can set up any control of overdevelopment," the report declares in a summary of the situation. "Those who own coal resources have a legal right to exploit them whenever they wish, even though that results in waste of resources. Conservation of coal resources has not as yet become a matter of public policy.

"If collective co-operation were extended throughout the industry overdevelopment would still introduce an uncertain factor into whatever arrangements the operators and miners might make (1) to produce coal more in accordance with need; (2) to exploit the resources most economically, and (3) to pay fair wages and a fair return on investment. Those who own unexploited coal resources could open new mines and change the whole competitive situation."

EDITOR'S NOTE—The foregoing Washington letter reflects certain views of official Washington. Due to the fact that policy as a rule prevents government officials from permitting their views being quoted directly, the authority for these reports is necessarily somewhat vaguely referred to. The views reflected are not those of any one group of officials, but of different men, in the legislative and executive departments. There is no necessary connection between their views and COAL AGE editorial policy; neither do they necessarily represent Mr. Wooton's personal views. It is felt that the opinions thus faithfully reflected will be of great interest to the industry. Where opinions are cited from sources outside of the government, the source will be specifically stated.

All but 4 of 294 Coal Miners Escape When Explosion Rocks Ehrenfeld Mine; Many Had to Be Told Blast Occurred

Due to a link coupling failing between the fourth and fifth cars of a trip of forty mine wagons traveling on No. 13 plane at Ehrenfeld No. 3 Mine, of the Pennsylvania Coal & Coke Corporation, Ehrenfeld, Pa., March 30, an explosion occurred at 12.15 p.m. which jeopardized the 294 men who were in the mine at the time. The cars broke apart about half way down the grade and the thirty-six uncoupled cars descended and were wrecked at the foot.

Apparently the wheel of an overturned car came in contact with a 500,000 circ. mil feed cable, creating an arc which ignited the dust about the wreck. It is believed that neither at the point of origin nor elsewhere did gas have any part in causing, or adding to the severity of, the explosion. The force and flame of the explosion traveled outby clear to the mine opening, but no evidence of force or flame can be observed more than 500 ft. inby of the point where the trip was wrecked, nor more than 50 ft. inby the switch where plane No. 13 joins the main heading. The four men who were killed were in the immediate vicinity of the switch. All four were employed in the transportation of coal.

There were two distinct emissions of smoke and dust reported at the mine portal, the interval between them being very short. The second emission was the heavier of the two. Most of the windows of the adjacent buildings were shattered, but no damage to their walls has been observed. A temporary frame waiting room between the two portals and 30 ft. in front of them was not disturbed. On the other hand, some of those in the buildings were thrown down or jarred.

Within the mine near the origin of the explosion there is little evidence of force. A few empty cars were derailed and the lids were blown from the locomotives. There was little timber in the main heading between plane No. 13 and the portals, and only a few light falls of slate occurred. The trolley wires were blown down and the brattices that block off the old workings on the upper side of the heading were destroyed. None of the 290 men who were inby the point of origin were aware that an explosion had occurred until they were informed by telephone from the outside.

Blakslee Acts Promptly

Superintendent S. W. Blakslee was in the mine office at the portal when the explosion occurred. He immediately ordered the main power line cut off and notified the general office at Cresson to summon relief. The promptness and the numbers with which neighboring operators, state inspectors, other individuals and organizations hurried men to the scene has never been equalled in central Pennsylvania.

Within 35 minutes of the time of the explosion Mr. Blakslee had telephone communication with the mine foreman

and the assistants in each of the inside sections. The mine telephones are connected by an inside and an outside circuit and all of them functioned except the telephone at the foot of the plane where the explosion occurred.

Instructions were given to men in the plane section to exit by the Salt Lick drift, over four miles from the main portal, at the back end of their section. The men in the most remote section, F-Main, were told to barricade themselves until further instructions. The F-Main shaft is a high point on the property and continues to draw, even with the fan idle. The men in the dip sections and the back end of the main heading were instructed to exit by the No. 4 shaft, which ventilates this area and which had been reported clear by a motorman whose trip had stopped near the foot of the shaft.

At this stage Superintendent Blakslee concluded that the air throughout the mine where men still remained or where the relief crews were working would be improved by starting the No. 1 fan on the Plane section. The fan was started about one hour after the explosion occurred. This drew fresh air from Salt Lick drift over the men walking toward it, and drew foul air off the main heading where the rescue crews were progressing. It also drew fresh air down the No. 4 shaft to the men gathered there, and some of this fresh air went by natural draft to the F-Main shaft. It also kept any fumes at the foot of Plane No. 13 from working back the main heading toward No. 4 shaft.

At 1.50 p.m. the first rescue party under T. D. Williams, inspector 6th District, entered the main portal. Soon after this the road from the F-Main section to No. 4 shaft was known to be clear, and the F-Main men were instructed to leave their barricade and proceed to daylight by No. 4 shaft.

Foremen Behave Admirably

The foreman and the assistants in all three sections exercised the greatest coolness and good judgment and reported perfect obedience and good morale in their men in every section.

The working forces of the three main sections having reached safety, only the hoistman and coupler at the top of Plane No. 13 had to be recovered. They had reported that they would barricade themselves in when the fumes coming up the plane became too strong. Rescue parties were on their way up from the foot of the plane, with the fresh air, and it was learned that assistant foremen Williams and Callahan, after seeing their men out of the Plane section, had returned and attempted to reach the two men at the head of the Plane from the upper end. Williams had been overcome and Callahan had just managed to return to the plane telephone and report. Helmet crews were then rushed to the Salt Lick drift.

The air at the head of the plane had



Crowd Awaiting Developments

Right portal of Ehrenfeld No. 3. The men in the mine left or were removed by other exits over the hills.

been improved by the operation of No. 1 fan, and the rescue party ascending the plane found the two men at that point in fair condition and able to walk out. The son of Assistant Foreman Williams was in this rescue party and he had several others continued until they came to Mr. Williams, who was unconscious but still alive. He was revived by artificial respiration, and a few minutes later a company rescue crew who had entered by the Salt Lick drift came up and carried Mr. Williams to that drift. Physicians were on hand, and he responded promptly to treatment.

All Out by 8 P.M.

By 8 p.m. all workers and rescue parties were out of the mine. All three fans were then started, with ventilation in its normal channels. The mine was expected to resume operations on Monday, April 4.

The Ehrenfeld No. 3 mine was opened in 1833 on the outcrop of the Miller Seam near South Fork, on the western slope of the Wilmore Basin. Its workings now penetrate an area of about ten square miles.

The main heading follows a water-level course or rises slightly. Coal is now produced from three principal working sections, two of which are to the rise of the main heading and one to the dip. Each section has its own ventilating system and outlets. The average distance from portal to working faces is about four miles. The capacity of the mine is 2,000 gross tons daily.

Six thousand feet from the portal on the main heading is the foot of Plane No. 13, by which coal is lowered from the "Plane Section" to the main heading. This is the first point inby the drift at which coal is fed to the main heading. The motor roads to the other two working sections branch off about 9,000 ft. inby the drift.

The mine is gaseous, is worked with closed lights and approved-type machines. About 300 men are employed on the day shift. The volatile matter in the coal is about 18 per cent.

Detonating Explosive in Open By Mud-Capping Kills 6

The danger of detonating a charge of explosive in the open by mud-capping methods in the presence of coal dust and the merit of rock dust as an agency to stop the ignition of coal dust were jointly demonstrated by an explosion on April 2 in No. 53 mine of the Ellsworth Collieries Co., at Cokeburg, Washington County, Pa., in which six men lost their lives.

This explosion occurred shortly after the day shift started work and was due to the ignition of coal dust by 40-per cent dynamite in a mud-capped charge used to break a large piece of roof rock at the face of a room. This procedure was sponsored by a fireboss, who incidentally was one of the victims of the blast. A preliminary investigation disclosed that two shots had been detonated simultaneously; that the blast resulting stirred up and ignited coal dust present in that room and in one adjoining and that ignition did not extend beyond the limits of these two places, due to the fact that the mine was rock-dusted.

It is believed that none of the victims met death by the direct force of the explosion and, as their bodies were only slightly burned, it is further thought that they died as a result of afterdamp. Three doors in the butt entries from which the affected rooms are turned were blown down and consequently the air was short-circuited.

Within two and one-half hours after the explosion ventilation was restored and all the bodies were recovered by the trained crews of the company. About 400 men were at work at the time of the explosion. Operation of this mine was resumed on Monday.

Illinois Blast Kills Eight

Eight miners were killed in an explosion in the Saline County Coal Corporation's Mine No. 2, at Ledford, Ill., on March 30. The bodies, charred almost beyond recognition, were recovered by a rescue crew several hours after the blast.

Industrial Coal Reserves Continue to Mount

Renewed productive activity during February in several major industries, according to a report by the National Association of Purchasing Agents, was reflected in an increase in coal consumption. Although the total—43,536,000 tons—was slightly lower than for January, the average daily consumption was greater, amounting to 1,554,856 tons, compared with 1,441,000 tons in the preceding month.

Industrial concerns continued to stock quietly but persistently, the association reports, consumers' reserves on March 1 totaling 65,735,000 tons, or an average supply for all industries of 43 days. The figures on Feb. 1 were 57,450,000 and 40, respectively.

Comparative Estimate of Output, Consumption and Stocks

(In Thousands of Tons)

	Output	Industrial Consumption	On Hand in Industries
October.....	63,267	41,115	44,271
November...	68,556	42,324	45,535
December...	66,104	45,085	49,373
January.....	63,128	44,671	55,010
February....	58,696	43,536	57,450
March 1.....	65,735

The explosion resulted when a miner's lamp ignited a pocket of gas in a section of the mine about two miles from the bottom of the shaft. The force of the explosion was such that three men 500 yd. from the scene were thrown to the ground.

The mine-rescue team from Eldorado, Ill., reached the scene soon after the blast. Two members of the rescue party were overcome by afterdamp but quickly regained consciousness when taken to the surface.

Members of the rescue team said that the miners undoubtedly were killed outright by the intensity of the explosion.

Gas Kills Three Rescue Men Unsealing Scotts Run Mine

Three apparatus men of a rescue team representing the Valley Camp Coal Co., of Parnassus, Pa., lost their lives on April 1 during the initial steps taken toward restoring ventilation in the mine of the Connellsville By-Product Coal Co., Scotts Run, northern West Virginia. The mine has been sealed since Jan. 28, when a large fire was discovered in its workings. This accident occurred shortly after 2:30 p.m. and resulted from the disarrangement of oxygen-breathing apparatus on the victims in an atmosphere containing only 0.2 per cent of oxygen. Earlier in the day Chief Lambie of the State Department of Mines and several others made an inspection of the mine and reported conditions ideal for the recovery of the sealed workings.

Entrance to the mine is gained through a manway slope 183 ft. long on an inclination of 20 deg., at the mouth of which air locks had been erected. The initial step decided upon for the restoration of ventilation was to establish a fresh-air base at the foot of this slope by the erection of such stoppings as would provide a short, direct connection between the manway slope and the mine fan through a portion of a return airway. The course of this connection is less than 500 ft. long. Two stoppings had already been erected and the ill-fated crew intended to erect a third stopping not far from the slope bottom.

At a point about 225 ft. from the outside, Roy Rustkin, the man in the lead, doubled up and fell. In the fall the nose clip and helmet of his apparatus became disarranged. The man directly behind him attempted to readjust the apparatus but was unable to do so because Mr. Rustkin fought him off. Mr. Rustkin died in the struggle.

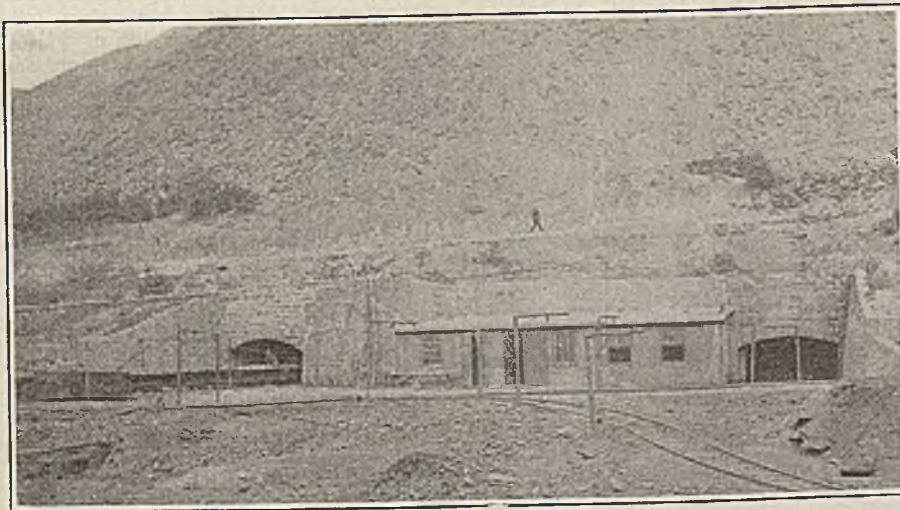
Second Man Collapses

Frank Burns, captain of the team, and John Brim immediately went outside for a stretcher and for aid. Reserves accompanied these men and found at the foot of the slope William Heagey in a position of collapse with his nose clip off. The reserves carried Mr. Heagey up the slope on a stretcher as far as the air locks. Here difficulty was encountered in getting the stretcher through the doors and in the excitement that followed the apparatus of several of the men in the rescue group was disturbed.

In the mêlée the men attempted to reach fresh air as best they could and in so doing it is believed the doors were opened without method. By this time a number of men, including Mr. Lambie, had congregated on the outside of the locks and assisted those who had been affected in getting through the doors to the outside. In this undertaking several of them were overcome also.

Then it was discovered that Frank Burns, captain of the team, was missing. A crew of men returned into the mine and found him lying dead half way down the slope.

The work of reopening the mine was resumed on Tuesday morning.



Blast at Ehrenfeld Came Out of Hill at This Point

This is the entrance to the Ehrenfeld No. 3 Mine of the Pennsylvania Coal & Coke Corporation. Windows were broken and persons knocked down when the explosion occurred. The long building is the lamphouse.



News Items From Field and Trade



ALABAMA

Free Labor at Banner Mine.—For the first time since its development the Banner mine of the Alabama By-Product Corporation is entirely manned by free labor. The corporation declined to renew its contract on April 1 with the state, which would have allowed it to retain the convicts until June 30, 1928, when all prisoners are to be removed from the mines under an act recently passed by the Legislature. About 325 men were removed from the stockades and distributed to the operations of the Montevallo Coal Mining Co., Sloss-Sheffield Steel & Iron Co., and employed in state-operated industries. The houses at Littleton and vicinity have been repaired and remodeled, churches and school facilities provided and all necessary conveniences installed for the new employees. A new entrance has been made into the mine which will greatly reduce the distance which the men will have to travel to the working places and man trips will carry them to and from their work. This is one of the heaviest producing mines in the district.

The Southeastern Fuel Co., Birmingham, with mines at Gorgas, has provided its employees with more than \$300,000 of co-operative group life insurance, purchased from the Metropolitan Life Insurance Co. The individual insurance ranges from \$1,000 for miners to \$3,000 for foremen, while executives are insured on a higher scale.

ILLINOIS

New Lines to Southern Field?—The Missouri Pacific R.R. has made preliminary studies for two new lines to tap the southern Illinois coal fields. Development of the projects depends somewhat on the outcome of the coal strike which went into effect on April 1. One line would be from a point near the Harrison mine in the vicinity of DeSoto, northwestwardly through Jackson and Perry counties to Pinckneyville, a distance of about 22 miles. The second line would be from the Scranton mine spur southeastwardly about 7.54 miles to a point near Crab Orchard. The two projects would cost approximately \$1,000,000.

KENTUCKY

Receivership Unsettled.—Arguments were heard March 25 before federal Judge Cochran of the U. S. District Court of eastern Kentucky sitting at Covington in the case of the First National Bank, Barboursville, against the Kentucky Fuel Co., Harlan County,

which has been in the hands of a receiver for several months. The bank is seeking to recover \$19,200 secured by mortgages on the property of the fuel company, which owns and acts as agent for the Turner-Jellico Coal Co., Clay County Coal Co., Coaldale Products Co., Morninglow Coal Co. and a smaller mining company. Judge Cochran took the matter under advisement until he can ascertain the validity of the mortgages held by the bank. If the mortgages are invalid, the court said, the receiver could proceed to sell the property for the benefit of all creditors.

The Solar Coal Co. of Yerkes, owned by Middletown (Ohio) and Hamilton (Ohio) capitalists, and of which Walter Harlan is president and W. A. Everson, secretary, went into receivership through the U. S. District Court of eastern Kentucky, at Covington on March 26. Carel Robinson as receiver will operate the property under orders of the court. Mr. Robinson has supervised the management of this property for some time past.

OHIO

Says Shortage Can Be Averted.—Fear that the coal supply in Ohio will be exhausted as a result of the suspension was minimized by B. F. Nigh, secretary of the Michigan-Ohio-Indiana Coal Association, in a statement to the public. With non-union mines operating, he says, there is little likelihood of a scarcity of fuel. "If people will place their orders in such a manner that will permit a steady flow of coal from dealer to consumer during the strike period, production can be held to a fair level" he said. "If, however, these consumers hold off their orders until the middle of the summer, when the lake season is in full swing, they can expect a growing coal shortage."

PENNSYLVANIA

House Passes Compensation Bill.—The House of Representatives at Harrisburg on March 28 passed the administration bill providing for increases in payments under the state workmen's compensation system. The measure was passed in the House by a vote of 187 to 1. The bill increases the minimum payments from \$6 to \$7 a week and the maximum payments from \$12 to \$15. Funeral expenses are increased to a maximum of \$150 instead of \$100 and payments for total disability are increased from \$5,000 to \$6,500. It is expected there will be little opposition to the bill in the Senate. There are several other compensation measures

in committees, but nothing much is expected to be heard of these.

A notice of suspension of mining was posted on March 18 at the Sykesville mine of the Cascade Coal & Coke Co., which had been in operation for several months. Superintendent Valentine stated that it was not possible to say how long the mine would be shut down.

The Westmoreland Coal Co. has declared the regular quarterly dividend of \$1, payable April 1 to stock of record March 24.

At the recent annual meeting of the Pittsburgh Coal Co., retiring directors were re-elected.

Cosgrove-Meehan Coal Corporation reports net earnings after interest and depreciation for the two months ended Feb. 23, 1927, of \$141,472, compared with \$75,135 for the same period last year. Sales totaled 643,188 tons, compared with 463,432 tons for the first two months of 1926.

The mines and mining committee of the House on March 22 reported out the administration's bill carrying amendments to the workmen's compensation act of 1915. The bill had been passed on first reading in the House prior to being recommitted. It came out of committee with minor changes, chiefly typographical. The bill was passed for the second time on Wednesday and will be taken up as a special order this week for third reading and final action.

Pennsylvania Coal Gains.—The Pennsylvania Coal & Coke Co. and subsidiaries report for February a surplus of \$47,498 after ordinary taxes, depreciation and depletion but before federal taxes, against a surplus of \$7,666 in February, 1926. The surplus for two months of 1927 was \$148,363 after the same charges, against \$26,265 a year previously.

Fair Breaker Destroyed by Fire.—Fire entailing a loss estimated at \$50,000, early March 24, destroyed the Fair Coal Co. breaker at Scranton and wrecked the coal-crushing machinery and equipment beyond repair. Opinion is divided as to the origin of the blaze. The company is an independent anthracite producer with one drift and a breaker and employs seventy men.

Mayor Keeps Out of Cave Dispute.—Mayor Jermyn of Scranton has refused to make use of police power to bring a stop to the operations of the Barron Coal Co. in South Scranton. "No one is going to lead me into a trap," the Mayor said in defending his position. Some city officials hold the Barron company is wrecking streets in South Scranton with its mining work and that

on this account the Mayor would be justified in using the police to stop further mining. The Barron company is doing second mining work in workings formerly owned by the Glen Alden Coal Co.

Oliphant Sale Again Postponed.—Sale of the Oliphant Coal & Coke Co. property at Wynn, in the Connellsville region, was indefinitely postponed March 19, as no satisfactory bids were received when the big Wynn plant was again offered at public sale following postponement of the original sale on Feb. 19. No announcement has been made by the receivers regarding future disposition of the plant.

River Coal Shipments Heavy.—Traffic on the three rivers in the Pittsburgh district for February was 2,827,860 tons. Of this, 2,444,624 tons was coal and 58,647 tons coke. More than 1,900,000 tons of coal was shipped in the Monongahela. Coal shipments in the upper Ohio totaled 500,000 tons.

WEST VIRGINIA

Amend Trolley Haulage Proviso.—Although submitting a favorable report on the Thomas bill relating to electric haulage in mines, the Mines and Mining Committee of the House of Delegates has added an amendment in the form of an additional clause. The original bill provided that "Electric haulage by locomotives operated from trolley wire is not permissible in any mine worked by safety or approved electric lamps, except upon the intake airway, fresh from the outside, but if in the opinion of the Department of Mines the danger to life and limb is increased by the intake being on the haulway, then special rulings covering the local conditions shall be made." The committee inserted the following additional provision: "In mines where the methane or CH₄ content does not exceed one-half of one per cent on the return of an air split special rulings on the use of electric appliances may be made by the Chief of the Department of Mines."

New Mine for Island Creek.—The Island Creek Coal Co., according to J. D. Francis, vice-president of the company, is preparing to open what is to be known as No. 22 mine in the Logan field and within 30 days contracts will be awarded for the construction of tipples and houses, the paving of streets and the hard surfacing of several miles of road to connect the new mining town with Holden. Two 400-ft. shafts are being sunk and the Chesapeake & Ohio Ry. is rapidly completing the four-mile extension of the Pine Creek branch which will provide an outlet for the coal produced. By October it is estimated that the new mine will be ready to be placed in commission.

Wants Oil and Gas Wells Cased.—Oil and gas wells, unless properly cased, constitute a grave menace to life and property in the mines of West Virginia, according to R. M. Lambie, head of the State Department of Mines, who advocates the passage of House Bill 125, introduced in the West Virginia Legislature. He states that the necessity for regulations covering oil

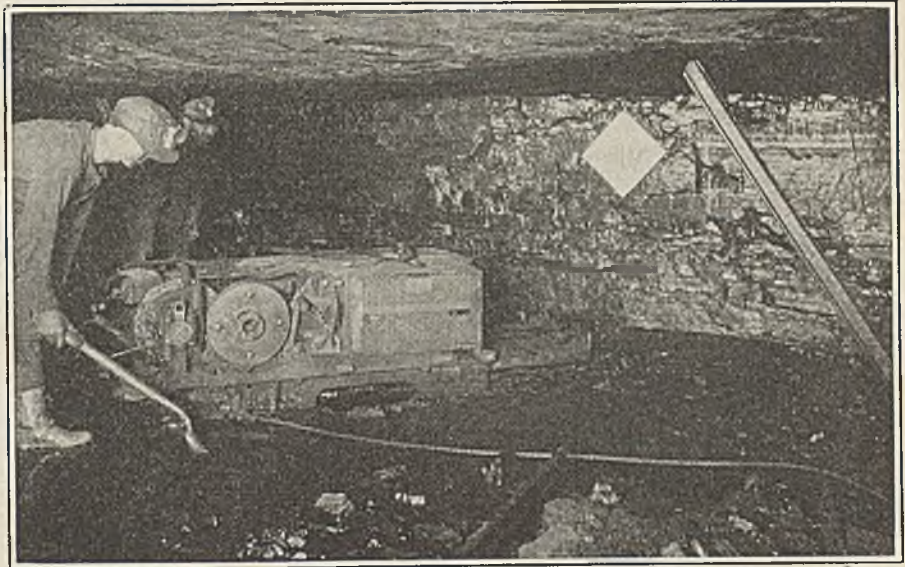
and gas wells is easily understood when it is known that there are thousands of wells in the state, a large number of which have penetrated coal seams.

Plans have been matured by the Clark Coal & Coke Co. to install additional equipment at its Eagle mine, in the northern West Virginia field. General improvements are being made with a view to increasing the capacity of the mine and tipple.

There is under construction at the

underlying No. 2 collieries, at Springfield, N. S., by tunnelling from No. 2 workings. This information was received from the mines office at Halifax. So far as can be learned, local officials of the coal company have not been advised of the permit, and the work is held up awaiting orders from Cape Breton.

Production of coke in Canada during February amounted to 158,248 tons, a decline of 10 per cent from the output of 176,445 tons in the preceding month



Undercutting in the Jellico Seam at Eagan, Tenn.

This is in a 40-ft. room of the Eagan mine of the Royal Blue Coal Co., Claibourne County. The back end of the machine is in an inch or more of water. The coal is 56 in. thick.

Wellsburg plant of the Bertha Consumers Co., a new steel tipple which will have a capacity of about 2,500 tons a day. It will be equipped with all modern devices with a view to enabling the mine to produce all grades of prepared coal. It is planned to have the new tipple completed and ready for operation about the middle of July.

Island Creek Output Climbs.—In a pamphlet report of the Island Creek Coal Co. for 1926, President Davis says: "Island Creek mines produced 6,568,930 tons of coal, an increase of 543,215 over 1925. Except in the early months of the year the mines operated at practically maximum capacity."

CANADA

Federal Aid for Coke Plants.—In the Canadian House of Commons on March 25, Charles Stewart, Minister of the Interior, introduced a bill providing assistance toward the establishment of coking plants. Mr. Stewart explained that the proposed legislation was in fulfillment of the recommendations of the Duncan report respecting the Maritime Provinces. Assistance was to be given to those who constructed plants on the basis of the cost of the plant. This would amount to 4 per cent on the cost of the plant in the case of private interests and 5 per cent in the case of the municipalities.

Besco to Work New Seams.—Permission has been given to the British Empire Steel Corporation by the Department of Mines to open the coal seams

and 4 per cent under the 166,062 tons reported for February a year ago. Imports of coke into Canada during February totaled 65,715 tons and exports amounted to 16,688 tons, leaving a supply of 207,275 tons available for consumption in Canada. During February 72,348 tons of Canadian bituminous coal and 153,761 tons of imported bituminous coal were used in coke making as compared with 77,768 tons of Canadian coal and 173,223 tons of imported coal during January.

Lignite finds in the James Bay basin, north of Cochrane, Ont., are to be investigated this summer, according to Charles McCrea, Minister of Mines. He states that the finds are "spotty," but that shaft-sinking will be done to determine whether a "type of coal" that could be used for fuel could be produced in that district.

Wolvin Out as Trust Company Agent.—R. M. Wolvin, president of the British Empire Steel Corporation, on March 25, formally announced the severance of his connection with the National Trust Co., Montreal, as receiver-manager for the Dominion Iron & Steel Co., wherein he has acted as chief agent for the trust company in charge of operations at the local steel plant. Mr. Wolvin's relinquishment of his position became effective at once. He said he was "unable to agree with the National Trust Co. on liquidation of the British Empire Steel Corporation, Ltd., and Dominion Steel Corporation, Ltd., without submitting same to the shareholders."

Among the Coal Men

R. L. Melendy has been appointed general manager of operations of the Consolidation Coal Co., effective April 1, with offices in the Watson Building, Fairmont, W. Va. Other appointments by the company at the same time include T. G. Fear as production manager of all divisions, succeeding G. W. Hay, resigned; M. S. Murray as engineer of transportation, and Fred Bedale as engineer of safety, all with headquarters in Fairmont.

S. S. Lubelsky is now at the Pittsburgh station Bureau of Mines completing the writing of "Investigation of Blasting and Mechanical Loading in Coal Mines." Mr. Lubelsky spent a year at the New Orient mine, West Frankfort, Ill., in connection with this work. Since graduating from the University of Illinois, in 1922, he has been actively engaged in metal and coal mining work in various parts of this country and Mexico.

Edward Page was elected president of the New England Coal & Coke Co., subsidiary of the Massachusetts Gas Co., at a directors' meeting in Boston March 24. He succeeds the late Robert Grant. A. G. Wood, treasurer and formerly assistant to Mr. Grant, was named vice-president, and Charles P. Chase, sales manager and director. W. C. Dikes is the new president of Castner, Curran & Bullitt, Inc.; J. E. Westervelt and H. P. Cannon, vice-presidents, and A. G. Wood, treasurer. J. L. Richards was appointed chairman of the board of the New England Fuel & Transportation Co. The Boston office of C. C. & B. was closed April 1 and Mr. Cannon, who was manager of this branch, has joined the New York office. All of the New England business of this company will be handled under the name of the New England Coal & Coke Co., while C. C. & B. will handle all the business outside of that territory.

R. T. Daniel has been elected president of the National Coal & Coke Co., Birmingham, Ala., succeeding J. Frank Rushton, deceased. William J. Rushton is vice-president; J. Frank Rushton, Jr., secretary, and Allen Rushton, treasurer. Officers of the Franklin Coal Mining Corporation, another of the Rushton mining concerns, have been elected as follows: R. T. Daniels, president; P. R. Jordan, vice-president and general manager; William J. Rushton, treasurer, and Allen Rushton, secretary. R. T. Daniel, who has been active in management of the companies, will continue the work as president.

A. E. Lee was elected president of the Chicago Wholesale Coal Shippers' Association at a meeting at the Great Northern Hotel, Chicago, March 29. George S. Wood was elected vice-president and G. H. Merryweather and F. A. Brahm, re-elected as secretary and treasurer, respectively.

W. W. Houston, former head of the Houston Coal Co., and one of the best known coal men in Tidewater Virginia, will marry Miss Frances Shelton Hund-

ley, in St. Paul's Episcopal church, Philadelphia, on April 16. After a wedding trip through the North Mr. and Mrs. Houston will be at home at the Cavalier Hotel, Virginia Beach, Va.

Governor Bibb Graves of Alabama has appointed William B. Hillhouse, of Birmingham, as chief mine inspector, succeeding Charles H. Nesbitt. Mr. Hillhouse has been actively identified with coal-mining operations in the Birmingham district for many years and is well known in industrial circles. Mr. Nesbitt, the retiring chief inspector, had served in this capacity for the past fifteen years. The department under his direction has shown marked improvement in service to the industry and in the collection and compilation of statistics, which are published annually. The seven associate inspectors will be appointed by the Governor at an early date.

Obituary

Alfred Reed Hamilton, one of the best known coal producers of central Pennsylvania and owner of the Bonny Leas and Mountain Orchard farms near Windber, Somerset County, died March 28, at his home in Pittsburgh. He also was known as publisher of the *Coal Trade Bulletin*, a sportsman, devoted to college athletics, and a horseman and breeder of sheep. He was born in old Allegheny city, July 19, 1872. Mr. Hamilton was president of A. R. Hamilton & Co., coal operators. He was a former director of the National Coal Association, vice-president during the World War period and as chairman of the bituminous committee on production evolved the plan for speeding up which was adopted by the government. He was a director in two Pittsburgh banks and a former president and director of the Windber Hospital. He was also prominent in church and charity work in his home city. Funeral services were conducted on March 29. He is survived by his wife and eight children, also three brothers and three sisters.

E. L. Brewer, of Satsop, Wash., president of the Morton Coal Co., Morton, Wash., died late in March at the Eatontown Hospital from injuries received when he fell head first from a 30-ft. trestle. The accident occurred when he was trying to lift a heavy plank from the trestle at the company's mine. He lost his balance and fell on his head, failing to regain consciousness.

Judge W. F. Hall, 70 years old, largely interested in coal lands and mining in the Harlan (Ky.) field and known as one of the wealthy developers of the district, died on March 27, of a three weeks' illness of paralysis. Mr. Hall for years had been a director of the First National Bank, and was active in many phases of development at Harlan. Judge Hall, with his brother-in-law,

J. T. Asher, were credited with getting the Louisville & Nashville R.R. to extend lines into Harlan County, where they controlled much coal acreage. His son, Elmer Hall, is a coal operator.

John T. Taylor, 71 years, retired coal operator of Belleville, Ill., died at St. Elizabeth's Hospital in Belleville on March 22. Death was due to bronchial pneumonia. Mr. Taylor was born in a small mining community in Pennsylvania on Oct. 6, 1855. He went to Belleville when 7 years old and at an early age went to work in the mines. Later he became the owner of various mines in the Belleville district.

Arthur Mitchell, 65, for many years mine inspector for the Pocahontas Fuel Co., died March 25 at his home in Pocahontas, Va., as the result of two strokes of paralysis. Mr. Mitchell was widely known in the Southern coal fields and for a long time was district mine inspector under John W. Paul. More than 20 years ago Mr. Mitchell went to Pocahontas but later left the community, to which he returned 15 years ago when he was made mine inspector for the Pocahontas Fuel Co.

William Hoskins, 27 years of age, superintendent of the Solar Coal Co., Conda, near Hazard, Ky., died on March 27, of injuries suffered on March 19, when he was struck by 33,000 volts of electricity, while up a pole, installing a blown-out fuse plug. Hoskins hung on the wire for six minutes until the current could be shut off.

Association Activities

The New River District Safety Committee met March 7 in the office of the New River Coal Operators' Association, Mt. Hope, W. Va., with a full attendance of representatives from all portions of the New River field. It was recommended at the meeting that each of the companies organize a safety club composed of mine officials and employees to work with the committee to spread efforts for safety among all employees in and about the mines. This committee, which is working in cooperation with R. M. Lambie, Chief of the State Department of Mines, and the local inspectors, will meet the first Monday of each month. The committee is composed of Edgar Blackwell (chairman), New River Co.; J. W. Garvey, Maryland New River Coal Co.; Guy S. Dooley, Loup Creek Colliery Co.; J. B. Horne, Stonega Coke & Coal Co.; Robert Thompson, Raleigh Coal & Coke Co., and F. E. Brown, South Side Co.

At the March meeting of the Smokeless Coal Operators' Association of West Virginia, held March 10 at the Waldorf-Astoria, New York City, the Cardiff Pocahontas Coal Co., Tug River district, was admitted to membership, and will be represented by A. E. Knee, vice-president, and by Maurice Walsh, of the Capitol Fuel Co., Cleveland, sales agent. A committee composed of R. H. Gross, president of the New River Co., and Edward Page, vice-president of the New England Coal & Coke Co., was named to prepare appropriate resolutions respecting the death of Robert Grant.

Production And the Market

Consumers Unshaken as Union Operations Suspend; Slight Gain in Loadings and Prices

A moderate increase in car loadings at the opening of the week and a slight increase in prices in a few districts marked the reaction of the bituminous markets of the United States to the suspension of production at the majority of operations in the Central Competitive Field, Iowa and the unionized sections of the Southwest on April 1. Nowhere was there any evidence of consumer panic; in fact the suspension began with most of the affected areas carrying unbilled loads on the mine sidings.

In the week immediately preceding the strike production approximated 13,375,000 net tons, according to the U. S. Bureau of Mines. Car loadings on March 28 and 29 totaled 80,923 cars, as against 79,681 cars for the first two days of the week ended March 26. Output for the first 51 weeks of the coal year aggregated 592,836,000 net tons—a record never before attained in the history of American coal-mining. The total output for the banner calendar year of 1918 was only 579,386,000 tons.

Eastern Prices Up

Coal Age Index of spot bituminous prices on April 4 was 172 and the corresponding weighted average price was \$2.09. Compared with the figures on March 28 this was an increase of 1 point and 2c. The increase was the result of stronger prices on West Virginia low-volatile coal in Middle Western markets, slight advances in quota-

tions on Ohio coals and advances in West Virginia high-volatile mine-run and slack and southeastern Kentucky mine-run and block in the Cincinnati market.

Cambria mine-run registered a slight gain in the New England all-rail market, but low-volatile pool coals were weaker in the New York and Baltimore tidewater trade. West Virginia smokeless again suffered a decline at Boston, but quotations at Hampton Roads showed greater strength. On the whole, however, the fluctuations in spot prices in the Eastern fields were far from violent. Stockpiles in the hands of consumers and tonnage still seeking a market were an effective check upon any sharp upward swing.

No Violent Bulges Expected

There is no feeling in the trade that any real advance in quotations is in the cards. To begin with, nothing approaching any heavy buying movement is expected before the end of June and there are some who put the date still farther in the distance. This less cheerful view was borne out by reports that some shippers were willing to sell coal for lake delivery after July 1 without demanding any advance over the current figures. Moreover, those favoring stiffer prices fear that any development in that direction in non-union territory would lead to the reopening of many of the union operations.

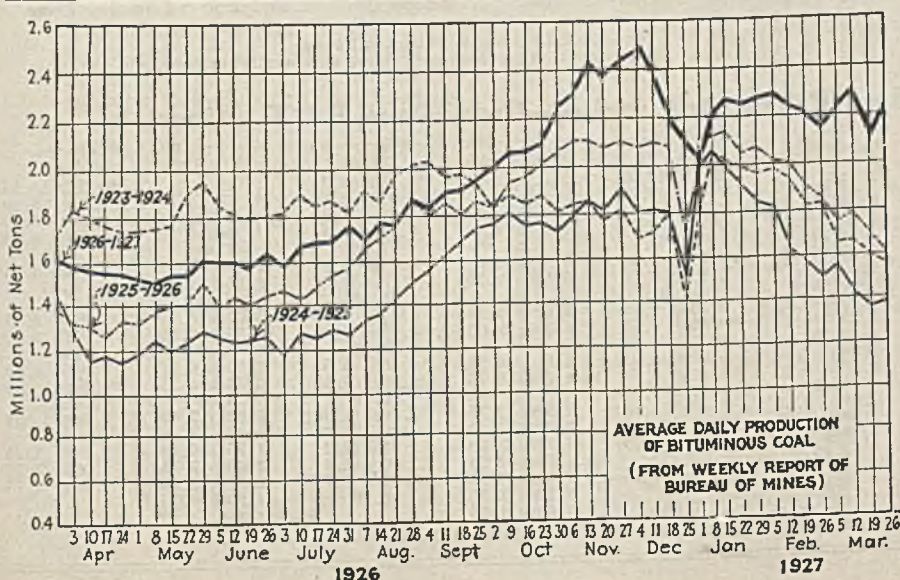
In the dock trade interest centers

upon an early start of navigation. Bituminous reserves at the Head of the Lakes have been depleted so rapidly that it is now estimated that the unsold tonnage there is less than 10,000 tons and the total stocks about 1,250,000 tons. A year ago the free coal was estimated at 725,000 tons and total stocks at 2,000,000 tons. However, there are no signs of worry in dock circles, as lake shippers believe supplies will be moved forward in ample time to meet any early-season demands for spot coal.

Anthracite Marks Time

"Marking time" is the best that can be said of the anthracite side of the market. There is, of course, some advance buying, particularly in Philadelphia territory, but the trade as a whole lags far behind that of a year ago. Production has been decreasing week by week. During the week ended March 26 the total output approximated 1,172,000 net tons, or 18.2 per cent less than the total for the preceding week. A year ago the output was 1,991,000 tons.

With the bulk of the second-quarter contract business in Connellsville furnace coke closed at prices 50 to 75c. under the figures ovens quoted some weeks back, it is not unnatural that spot prices also have weakened. This weakness has extended to the foundry trade although nominal quotations on foundry coke are unchanged. Production at the furnace-ovens is increasing.



Estimates of Production

(Net Tons)

BITUMINOUS

	1926	1927
March 12.....	10,690,000	13,778,000
March 19 (a).....	10,263,000	13,009,000
March 26 (b).....	9,626,000	13,375,000
Daily average.....	1,604,000	2,229,000
Coal yr. to date (c).....	532,145,000	592,836,000
Daily av. to date.....	1,755,000	1,953,000

ANTHRACITE

March 12.....	1,966,000	1,488,000
March 19.....	1,963,000	1,432,000
March 26.....	1,991,000	1,172,000
Coal yr. to date (c).....	50,361,000	91,485,000

BEEHIVE COKE

March 12.....	262,000	196,000
March 19.....	263,000	205,000
March 26 (b).....	251,000	200,000
Cal. yr. to date (c).....	3,774,000	2,298,000

(a) Revised since last report. (b) Subject to revision. (c) Adjusted to equalize number of days in the two years.

Midwestern Shutdown Effective

The closing down of association mines in Illinois, Indiana and Iowa on March 31 did not create a ripple of real interest in the Midwestern markets. In Illinois a large quantity of coal has been carried over. Some of this tonnage, however, already has been sold for April and May delivery, but a larger number of cars are being held for later spot shipment to old customers. For the time being at least, circular prices on this coal continue at the old basis.

The majority of the Indiana mines cleaned up their unbilled loads prior to the end of last month. Some of the larger operations are holding 25 to 50 cars, but most of this tonnage has been sold and is awaiting shipping instructions from the purchasers. As is the case in Illinois, quotations on the spot coal available have not been changed in the past few days.

Although some of the mines began "skinning up" and cleaning out as early

as March 26, working time at most of the operations was fairly steady. Estimates of the tonnage standing on mining sidings in southern Illinois run from a 30- to a 60-day supply. Heavy railroad buying cut down accumulations in the Mt. Olive district so that that field, both relatively and actually, closed the month with a smaller reserve than either southern Illinois proper or the Jackson-Duquoin section. The Standard district is long on large sizes.

Smokeless Prices Withdrawn

A number of the larger companies shipping smokeless coal to the Chicago market withdrew their quotations on prepared prices. Just why such action was taken was not clear to local buyers, although it was assumed that it was a strategic move to check declines. High-volatile Eastern coals are a drag at the present time. Demand for anthracite is sluggish and the coke market is very quiet.

Carload buying was active in the St.

Louis market the closing days of March, but the supply available was more than ample to meet the demand. There was some difficulty, perhaps, in picking up Standard district screenings, but prices showed no upward swing. Part of the strength in small Standard coal was due to the fact that a number of mines closed down when insurance companies cancelled their compensation policies. Domestic buying was slow last week. Retail prices effective April 1 showed reductions of 25 to 50c. on Illinois coals, 75c. on smokeless and \$1 on anthracite and coke.

Interest in spot Kentucky coals was at such a low ebb in the Louisville market last week that coal men are not talking of higher prices before May or June. And, it is feared, any great increase then would encourage union mines to reopen under the old scale pending a new agreement. Should that happen, it is pointed out, non-union mines would be compelled to struggle for the high-dollar business. Buyers

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

Table with multiple columns for market quoted prices, dates (Apr. 5, Mar. 21, Mar. 28, Apr. 4), and regions (Low-Volatile Eastern, Midwest, High-Volatile Eastern, South and Southwest). Includes various coal types like Smokeless lump, Clearfield mine-run, etc.

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

Table with columns for Market Quoted, Freight Rates, and prices for various anthracite grades (Broken, Egg, Stove, Chestnut, Pea, Buckwheat, Rice, Barley, Birdseye) across different companies and dates.

*Net tons, f.o.b. mines. †Advances over previous week shown in heavy type; declines in italics. ‡Domestic buckwheat (D. L. & W.), \$3.50

show no inclination to hasten the day of rising prices.

Kentucky Prices Unchanged

Spot quotations were unchanged on both eastern and western Kentucky coals. Movement, however, continued on a substantial basis, with steam coal commanding the center of the stage. Nevertheless, current prices of \$1.25@ \$1.60 represent no unusual bulge, but are more in line with the normal spring adjustment brought about by the decline of shipments of prepared coal. The lake trade is proving a boon to the eastern part of the state.

The Head of the Lakes is viewing the suspension in the Central Competitive Field with unshaken calm. On March 31 it was estimated that the docks at Superior and Duluth were carrying 1,250,000 tons of bituminous coal and 330,000 tons of anthracite. A year ago the docks had about 2,000,000 tons of bituminous in storage. Of that quantity approximately 725,000 tons was free coal; today it is said that not over 7,000 or 8,000 tons is unsold.

With the promise of an early opening of navigation and with a number of cargoes already loaded at the lower ports, dock operators see nothing menacing in the small supply of free coal. Salesmen are covering their regular territory and are ready to accept new contracts on the basis of current quotations. Until the situation in the union fields has become less uncertain, however, both buyer and seller will favor spot transactions.

Dock Territory Calm

Coal dealers in Milwaukee territory are undisturbed by the strike in the Central Competitive Field. Dock managers are more concerned with the early arrival of cargoes from the lower ports. Local retail prices have been cut from 35c. on pea to 95c. on nut. A reduction of \$2.40 has been made in the retail price of coke. There are no startling developments in the market at the Twin Cities. Forehanded industrial purchasing agents are well fortified against any scarcity and now are interested only in bargain offers. These, at present, are not to be found.

Most of the Southwestern field marked time last week, waiting to see how far the suspension in the union districts might affect operations in the section which broke away from the Indianapolis organization in the past three years. The Bernice (Ark.) district, however, announced April storage prices of \$6.50 on grate, \$6.75 on egg, \$8.50 on No. 4 and \$5.25 on Chestnut. These prices are \$1.25 to \$2 under the quotations which were in effect a year ago.

Spring weather has brought weakness to the demand for both steam and domestic grades in the Colorado market. The number of "no bills," however, is not large. Mines have been running three to three and one-half days a week, with no interruptions chargeable to labor or transportation disabilities. Prices are unchanged. In Utah there was a month-end weather flurry of buying which soon exhausted itself. The market is easy on all sizes, with the surplus greatest in lump and slack.

Better Tone to Cincinnati Market

Increased shipments to the lower lake ports and orders from Illinois, Indiana and Ohio have quickened the Cincinnati market and rescued it from deadly dullness. The annual seesaw between lake buyers and lake shippers now is working to the advantage of the former and sales agents have been rushing to the lake ports to present their claims to the men who can place orders. While the \$1.60@ \$1.65 mine-run basis is held, it is reported some shippers are less stiff in their demands for increases after July.

Smokeless prices are unsettled. Some agencies have dropped quotations on lump and egg 25c.; others are holding to the \$3 base, making a range of \$2.50 @ \$3. Mine-run on contract is held at \$2.25 and there is little spot tonnage to be had under \$2. Slack is \$1.90@ \$2. The spread in high-volatile prices is narrowing, with steam coals moving upward. Eastern Kentucky block also is stronger.

Movement through the Cincinnati gateway showed a substantial increase last week when 14,966 cars were interchanged. This was an increase of 1,252 loads over the preceding week and 5,791 cars over a year ago. The number of empties en route to the mines,

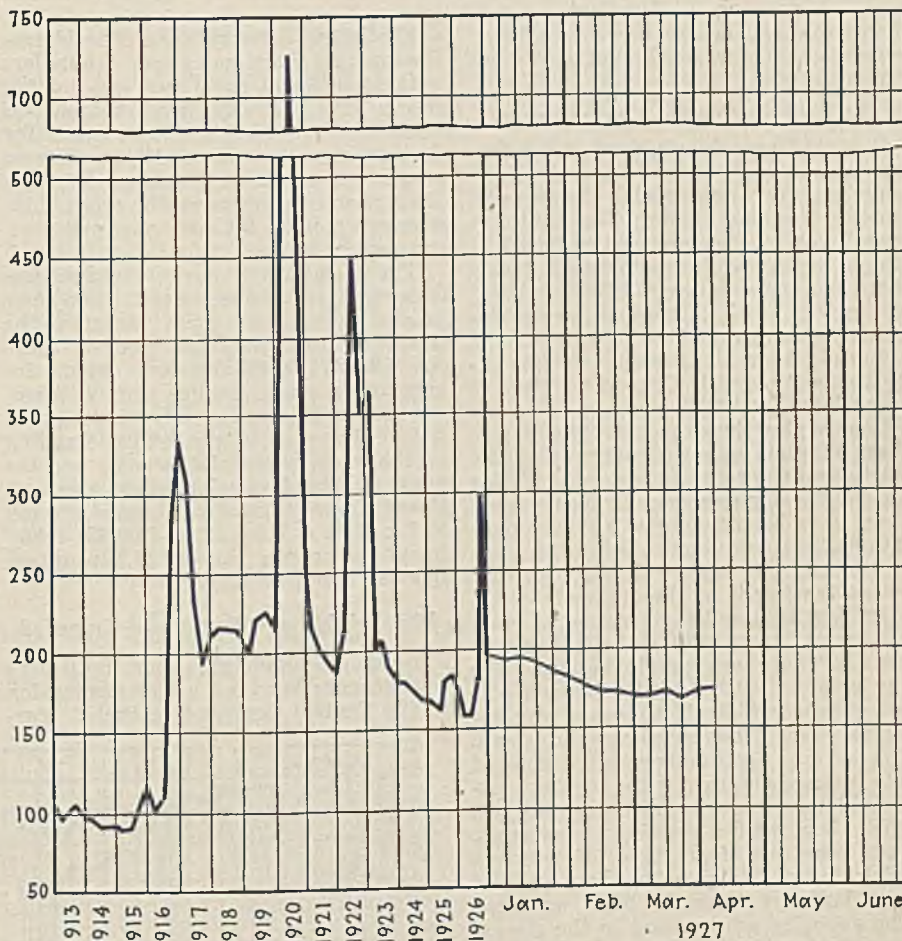
however, dropped from 13,700 to 13,004 cars. Movement to the Louisville & Nashville increased 101 cars, but the supply sent to the Chesapeake & Ohio fell off 776 cars.

Ohio Indifferent to Strike

Southern and central Ohio buyers preserved their indifference to the possibilities of the suspension until the union mines went down. A slight stiffening in prices here and there, a little heavier buying in spots—but all so unobtrusively done that the general level of the Columbus market was unchanged. Retail trade is slow and retail prices have been cut to the usual summer bases. Spot steam buying make no great stir although southern Ohio production was up to 30 to 35 per cent of capacity the last week in March.

Buying increased in the No. 8 field last week, but there was plenty of coal to take care of the orders and prices registered only moderate advances. Production during the week ended March 26 jumped to 380,000 tons, or approximately 54 per cent of estimated capacity. This was an increase of 17,000 tons over the preceding week and 163,000 tons greater than a year ago.

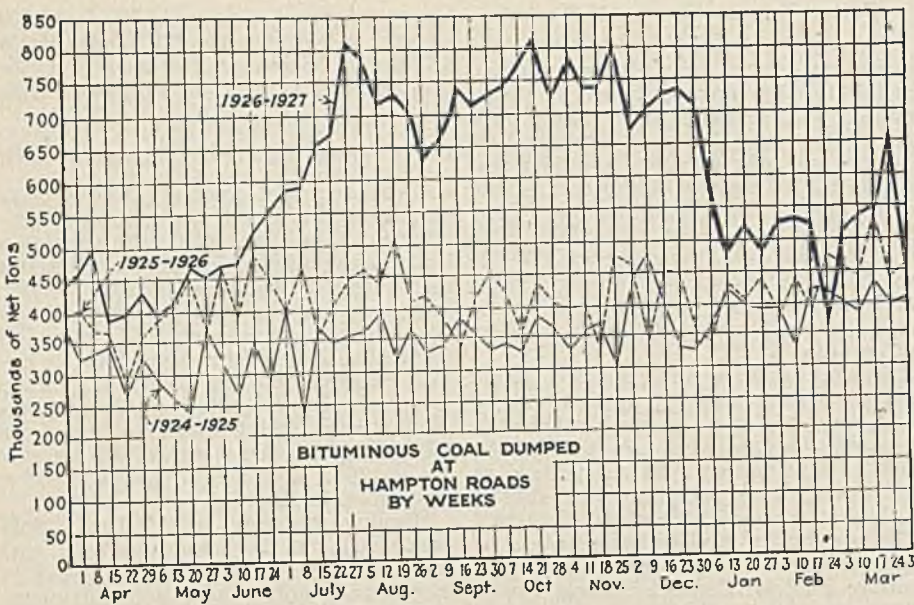
The decision of the union to permit Central Competitive Field mines to run



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

Index	1927				1926	1925
	Apr. 4	Mar. 28	Mar. 21	Mar. 14	Apr. 5	Apr. 6
Weighted average price	\$2.09	\$2.07	\$2.06	\$2.07	\$1.93	\$1.96

This diagram shows the relative, not the actual, price on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States, weighted first with respect to the proportion 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.



on the same terms offered the outlying fields pending the negotiation of a new agreement was interpreted by large consumers buying in the Pittsburgh district as meaning that there was little chance for any great rise in prices. Spot trading during the week was at a minimum. The nominal prices prevailing were unchanged. How far the opening movement can go in western Pennsylvania, of course, will not be known for some time.

No Rush in Central Pennsylvania

Central Pennsylvania market developments last week were routine in character and without special significance. During the past month the field has been busy mining coal—a large part of which has gone into storage. Today there are approximately 2,000 “no bills” in the field. Prices, however, are maintained without difficulty.

Buffalo spot bituminous trade is almost at a standstill. Consumers seem to be well supplied with tonnage and little active buying is expected this month. West Virginia mines are promising the market all the tonnage it needs. Prices are practically unchanged. Some operators have been trying to advance quotations, but consumers decline to place orders at the higher levels, so that actual trading is at the old basis.

In New England the steam-coal market drags along with no relieving features. There are ample reserves for any eventuality, and in consequence it is extremely difficult to rouse any interest among buyers, large or small. The several factors here have entered into understandings with regular customers that provide a month-by-month price, but with a specified maximum, and there are few signs of tonnage being diverted from usual channels. Of spot business there is little or none. The agencies are keeping in the closest possible touch with the trade, but it is realized it will be weeks if not months before there is any marked change.

No Troublesome Pier Accumulations

Hampton Roads accumulations are only moderate, and there is a disposition now to look to the West for the first indications of better demand. Prices f.o.b. vessel are fluctuating between \$4.25 and \$4.50, depending upon

the reputation of the coal and the individual situation of the shipper. A few producers are sending coal to the piers only on actual requisition against firm orders, but there is still enough desire to keep production up to the highest marks practicable so that the volume available is swollen beyond prudent limits.

For inland delivery from Providence, Boston and Portland those rehandlers with facilities of their own are holding prices on a \$5.90@ \$6 level, but on this basis they are making little room for further receipts. Most of the distress coal is out of the way and, profiting by their recent experiences, the other shippers are going a bit slow on April commitments.

The New York market is inactive. Industrial consumers assert that their stocks will carry them through the month of June. Railroad reserves average 60 days, although some roads are carrying a much smaller supply. Shippers do not look for any real upturn before July 1. In the limited trading of the week, high-volatile coals had the edge on the low-volatiles in demand. Broad Top mine-run was quoted around \$2.75; B. R. & P. coals, \$1.75@ \$2; Pittsburgh mine-run, \$1.40@ \$1.50; three-quarter lump, \$1.60@ \$1.75.

Philadelphia and Baltimore Unmoved

Neither Philadelphia nor Baltimore appear concerned over the suspension in the Central Competitive Field. Pur-

chases in the Philadelphia market are kept close to immediate requirements as most of the larger consumers have completed their stocking programs. Spot quotations are unchanged. There has been little building up of stockpiles in Baltimore territory and prices on pools 1, 9 and 11 are slightly weaker.

Retail buying in the Birmingham district is progressing fairly well, but the volume of sales is not up to the record of last year. Steam trade is rather quiet and spot sales are comparatively light and inconsequential. There also has been some slowing up in the movement of tonnage to contract customers other than coke ovens, which are taking their full normal quotas. Prices are unchanged. Mines are averaging three to four days a week.

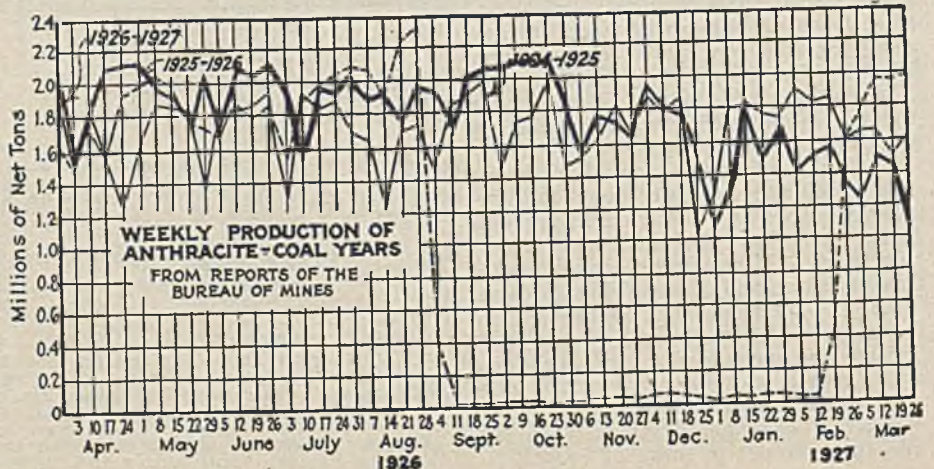
Dullness characterized the New York anthracite market last week. Movement was slow and buying orders were small. Retail distributors, however, look forward to a more active demand from the householder within the next week or ten days. Egg and stove moved more freely than nut. Pea also maintained its relative position. Effective April 1 the Lehigh & Wilkes-Barre and D. L. & W. Coal companies reduced their circulars on pea from \$6.50 to \$6. Demand for No. 1 buckwheat was unusually brisk.

Philadelphia Market Improves

A moderate flow of retail orders from Philadelphia helped the operating end of the industry. Wholesale prices, generally speaking, have settled down to the company basis or less and only a few independent coals command premiums of 25 to 75c. Retail prices have been cut to \$14.25 on egg and nut, \$14.75 on stove and \$11.25 on pea, with one company 50c. less on egg, stove and nut and 25c. less on pea. Company shippers are asking \$2.50 on buckwheat, \$2.25 on rice and \$1.50 on barley on contract orders. Spot demand is easier.

Mild weather has had a soothing effect upon Baltimore retail demand and the anthracite trade there is marking time. The Buffalo market also is quiet and lower prices have not moved the dealers to add heavily to their stockpiles. Retail prices have been reduced about 40c. April quotations on grate, egg and nut are \$13.20; stove, \$13.60; pea, \$11.10. These prices are subject to a discount of 25c. for payment within 10 days after delivery.

Probably 75 per cent of the second-quarter tonnage on furnace coke in the



Car Loadings and Supply

	Cars Loaded	
	All Cars	Coal Cars
Week ended March 26, 1927.....	1,008,888	206,990
Week ended March 19, 1927.....	1,006,861	206,452
Week ended March 27, 1926.....	967,838	171,413
Week ended March 20, 1926.....	977,209	183,205

	Surplus Cars		Car Shortages	
	All Cars	Coal Cars	All Cars	Coal Cars
March 23, 1927.....	252,751	71,677		
March 15, 1927.....	257,186	77,902		
March 22, 1926.....	213,780	79,551		

Connellsville region has been closed at \$3.50, with special grades going at \$3.65 and \$3.75. A few weeks ago ovens were talking \$4@ \$4.25 on this business. Spot furnace coke is easy at \$3.25, with trading light. Spot foundry is still quotable at \$4.50@ \$5, but some coke is to be had at less and a few premium grades command more.

Production of beehive coke in the Connellsville and Lower Connellsville region during the week ended March 26 was 144,990 net tons, according to the Connellsville Courier. Furnace-oven output was 77,200 tons, an increase of 8,500 tons when compared with the preceding week. Merchant-oven production was 67,790 tons, a decrease of 3,350 tons.

C. F. & I. Mines 3,307,048 Tons

The Colorado Fuel & Iron Co. produced 3,173,683 net tons of coal and purchased 133,365 tons in 1926, according to the company's annual report. Of this total, 1,104,648 tons were used in making coke—132,371 tons in beehive ovens and 972,277 tons in byproduct ovens—521,390 tons were used at company plants, and commercial sales totaled 1,681,363 tons.

Coke output was 665,676 net tons, of which 72,737 tons were produced by beehive ovens and 592,939 tons in byproduct ovens. Company plants consumed 28,067 tons of beehive coke and 573,954 tons of byproduct coke. Commercial sales of coke consisted of 44,670 tons of beehive and 18,985 tons of byproduct.

Keen Competition Source Of Ideas, Says Gandy

"The world has scant sympathy for the individual or business that yields complacently to the pressure of completion, be it a pressure which batters at prices or what not," said Harry L. Gandy, executive secretary of the National Coal Association, speaking at the forum of the Chamber of Commerce at Cincinnati, Ohio, March 29.

"The history of business is replete with records in which utilization of new ideas, in the face of the most grueling competition, have saved the day," he continued. "The first big idea with which the sales portion of the industry must become thoroughly saturated is that the cry of selling today is for available figures on which analysis and understanding of business may be based. Such statistical information will give birth to ideas which will solve many problems."

Roads Consume More Fuel; Price Advances

Class 1 railroads of the United States consumed 9,186,141 net tons of coal in train locomotives during January last, according to a report by the Interstate Commerce Commission. This is an increase of 32,422 tons over the total for the corresponding month of last year.

The average cost per net ton, including freight, of such fuel in January, 1927, was: Eastern district, \$2.84; Southern district, \$2.24; Western district, \$2.89; United States, \$2.71. Compared with the corresponding month of the preceding year there was an increase of 20c. in the Eastern district, 4c. in the Southern, a decrease of 2c. in the Western district, and an advance of 10c. for the country as a whole.

Utility Fuel Consumption Recedes in February

Public utility power plants in the United States consumed 3,346,309 net tons of coal during February, according to a report by the U. S. Geological Survey. This compares with 3,801,639 tons used in the preceding month, the decline being due largely to the shorter month. Fuel-oil consumption by these plants in February totaled 668,621 barrels, against 813,087 barrels in January.

The average production of electricity by public-utility power plants in February was 217,400,000 kw.-hr. per day, slightly larger than the revised figure of 217,100,000 kw.-hr. per day for January.

The total output of electricity by public-utility power plants for January and February of this year was about 1,100,000,000 kw.-hr., or 9.3 per cent larger than the total output for January and February, 1926. The output for the first two months in 1926 was nearly 11 per cent larger than the output for the same two months in 1925.

Soviet Sinks New Coal Shafts

Six new shafts are being sunk in the coal fields of the Don Basin of the Soviet Union, according to an announcement by the Amtorg Trading Corporation, New York City. These will open a new section to be called the New Don Basin. During the coming summer work will be started on nine more shafts. It is estimated that the fifteen shafts will yield, when completed, 6,500,000 tons of coal yearly. The output of coal from mines operated by the Donugol Trust in the Don Basin for February was 1,600,000 metric tons, an increase of 6.6 per cent over January.

British coal output the week ended March 19 increased after the recent set-back, totaling 5,317,600 gross tons, against 5,276,500 tons in the previous week. The highest weekly output since the strike was 5,671,400 tons in the week ended Feb. 26.

Shipments of Soft Coal to Great Lakes Ports for Cargo Loading, Seasons 1919 to 1926, by Districts of Origin

District	(In Net Tons)							
	1926	1925	1924	1923	1922	1921	1920	1919
Eastern Kentucky.....	6,933,527	6,606,932	3,514,355	3,297,476	3,091,089	2,624,194	1,375,323	1,425,466
Ohio:								
Cambridge.....	68,181	4,381	1,005,498	954,867	615,736	981,997	778,776	802,150
Hocking.....	173,953	115,496	90,165	919,927	1,288,269	668,577	2,575,086	1,072,424
Northern Ohio.....	29,724	15,704	57,327	361,567	194,608	208,994	453,829	155,646
No. 8.....	1,149,102	1,316,428	2,851,212	3,716,307	1,287,123	3,678,554	3,799,023	3,809,584
Pennsylvania:								
Altoona and Meyersdale.....	1,875	1,398	1,605	31,316	81,420	30,182	22,410	10,227
Connellsville.....	598,494	367,418	548,327	468,859	374,936	*	*	*
Northern Pennsylvania.....	825,487	5,096	482,484	1,081,927	832,339	723,819	1,044,579	557,557
Pittsburgh.....	2,506,685	2,106,587	3,249,209	7,977,903	4,002,214	5,907,489	6,203,444	6,512,051
West Virginia:								
Cumberland-Piedmont.....	3,050	4,023	5,146	796	676	4,352	21,459	8,642
Fairmont.....	2,141,924	1,623,499	1,404,159	3,169,505	1,369,969	1,014,514	1,284,041	828,383
Kanawha.....	7,548,932	7,803,062	5,754,567	4,581,656	2,671,251	3,687,136	3,020,946	3,393,849
Moundsville.....	326,877	760,614	†	†	†	†	†	†
New River.....	431,301	396,091	353,049	448,566	271,630	208,890	233,633	537,436
Pocahontas.....	3,404,807	3,295,537	2,630,625	2,445,507	1,665,556	2,430,559	1,434,183	2,313,728
Thacker-Kenova.....	1,595,598	1,794,479	977,870	383,016	761,962	190,911	143,645	314,022
Winding Gulf.....	280,452							
Tennessee.....	82,629	17,562	55,248		25,667	3,731	185	13,109
Virginia.....	59,921	98,877	202	723	43,208		92	1,591
	28,162,499	26,333,184	22,981,048	29,839,918	18,577,653	22,363,899	22,390,654	21,755,869

* Included with Pittsburgh before 1922. of Mines.

† Included with Fairmont before 1925.

Figures from Ohio Bureau of Coal Statistics, released by U. S. Bureau

Foreign Market And Export News

France Cuts Prices in Face Of Threatened Strike

Paris, France, March 24.—Spurred on by government agencies, French mines have announced spring reductions in prices in the face of threats of the miners to quit work if an attempt is made to lower the wage rates paid the men at the pits. The new schedules for coal from the Nord and Pas de Calais collieries, effective March 16, show reductions of 23 to 40 fr.

On sized coals, both French and Belgian, the following prices have been announced:

	Semi- and Quarter Bituminous Lean	
	198 fr.	198 fr.
Lumps and big galleets..	213	213
Small galleets	230	240
Cobbles (50x80mm.).....	240	250
Washed nuts (30x50mm.)	185	185
Washed beans (20x30mm.)		

These prices are subject to discounts of 15 fr. for April deliveries, 12½ for May, 7½ for July and are net in September.

In the Loire basin, where employers and employees still are negotiating over a new wage scale, prices have been cut 6 to 15 fr., making large screened coal 192@202 fr.; nuts, 196@200; small screened, 163@182; washed peas, 165@174; small nuts, 191@203; large unscreened, 151@165; raw smalls, 118@123; washed smalls, 148@156 fr.

Loire operators are asking their men to take a cut of 7 per cent. In Lorraine the new wage proposals call for a reduction of 5 per cent in base rates and 1½ fr. cut on indemnity allowances for increased cost of living, with an advance of 40 centimes in the cost of coal to the miners. A total reduction of 8½ per cent is planned in the Sarre, part of the reduction effective March 15 and the rest on April 15. This proposal has been made on the initiative of the Minister of Public Works.

In the meantime the discussions over wages have had little effect upon current buying. During the last few days there has been some increase in the number of orders placed for industrial fuels, but the demand for household grades is moribund.

Negotiations are under way between representatives of the Kohlensyndikat and French metallurgical interests on the further working out of agreements for the sale of German coke. The Kohlensyndikat delegates have consented to the proposal that current shipments be reduced approximately 40,000 tons per month with the understanding that the undelivered tonnages may be absorbed later.

To date, however, the Germans have declined to make any concession in prices. In view of the fact that outside offers as low as 16 mk. have recently been made, it is considered probable that the Kohlensyndikat will finally consent to some downward revision of

the 21 and 19 mk. figures now carried in contracts negotiated some time ago.

During February France imported 2,047,093 metric tons of coal, of which 810,882 tons came from Great Britain and 851,243 tons from Germany; 431,072 tons of coke, principally from Germany, and 80,475 tons of patent fuel. Exports for the same month were: Coal, 413,063 tons; coke, 22,363; patent fuel, 17,216 tons.

No Life to Belgian Market

Brussels, Belgium, March 22.—The general trend of the Belgian coal market is unchanged. Reductions in prices still are the order of the day, but these reductions do not seem to arouse apathetic buyers. The best than can be said of the situation from the standpoint of the Belgian colliery proprietor is that the steady decline in quotations is putting Belgian figures on a closer competitive basis with prices asked for foreign coals.

Industrial consumers cannot be rushed into entering new commitments, preferring to hold out for further concessions in prices. The pressure of German competition is hurting the sale of semi-bituminous coals. The market in lean duffs is less weak because the brick-making season is near at hand; nevertheless the first of the month saw another cut of 10 fr.

Reductions in prices on household grades fail to stimulate domestic orders. Patent fuels, too, are soft, with No. 2 briquets at 200@210 fr. The Belgian coke syndicate has announced a price of 230 fr. on half-washed coke for March delivery, but that price is not observed by all ovens and it is said that fuel can be obtained at 210 fr.

Campine Makes Rapid Strides

Production in the Campine coal field of Belgium made a remarkable gain last year. In 1923, the first year of active operations, the district produced 807,650 metric tons; in 1924, 1,106,550 tons; in 1925, 1,135,260 tons and last year, 1,847,000 tons. This region produces an anthracitic coal.

Yorkshire Wages Up

The first ascertainment of wages in the Yorkshire coal fields following the new agreement reached at the end of the coal strike last year has resulted in a percentage addition to the base rate for March of 61.81 per cent. This is 15.14 per cent more than the minimum in effect during the prestrike period and under the agreement to the end of February. The increase is attributed to higher prices and the increase of one-half hour in the length of the working day.

Cable advices from London on March 28 stated that large Welsh Admiralty

was firmer at 23s.@23s. 9d., but that other grades were weak. Slack demand also ruled in Scotland and the North-east. Durham coke is still about 10s. above prestrike figures. As a result a recent order for 20,000 tons for the Tees Ironworks went to German ovens.

Hungarian Production Steady

Hungarian coal production in 1926 (preliminary figures) was about 6,800,000 metric tons, or approximately the same as in 1925. The greater part of this production is low-grade bituminous and lignite coal. Imports in 1926 totaled 920,000 tons or about the same as in 1925. Exports increased from 283,000 tons in 1925 to 420,000 tons in 1926, caused largely by shipments to Italy and Jugoslavia.

Export Clearances of Coal, Week Ended March 31

FROM HAMPTON ROADS		Tons
For Miquelon:		
Swed. Str. Isa, for St. Pierre.....		1,846
For New Brunswick:		
Amer. Schr. Harry G. Deering, for St. John		1,832
For Cuba:		
Nor. Str. Askeladden, for Cienfuegos		3,328
Br. Str. Laurel Park, for Manati.....		2,172
For Bermuda:		
Amer. Schr. Anna R. Heidritter, for Hamilton		993
For Brazil:		
Br. Str. Golden Sea, for Santos....		6,216
Br. Str. Magdala, for Pernambuco..		6,253
Br. Str. Ayruoaca, for Rio Janeiro..		6,647
For British West Indies:		
Nor. Str. Betty, for Barbados.....		3,519
For Jamaica:		
Nor. Str. Certo, for Kingston.....		2,030
For Spain:		
Br. Str. Hydaspes, for Barcelona....		5,974
For Italy:		
Nor. Str. Johanne Dybwad, for Geno		4,033
Ital. Str. Mincio, for Trieste.....		6,873
FROM BALTIMORE		
For Cuba:		
Br. Str. Rowanpark, for Daiquiri....		2,649
For Italy:		
Ital. Str. Lucia C, for Trieste.....		2,206
FROM PHILADELPHIA		
For Cuba:		
Nor. Str. Sonkdal, for Havana.....		—
For Newfoundland:		
Dan. Str. Bernholm, for St. Johns... —		—

Hampton Road Coal Dumpings*

	(In Gross Tons)	Mar. 24	Mar. 31
N. & W. Piers, Lamberts Pt.:			
Tons dumped for week.....	270,377	127,138	
Virginian Piers, Sewalls Pt.:			
Tons dumped for week.....	125,938	140,627	
C. & O. Piers, Newport News:			
Tons dumped for week.....	188,137	141,626	

*Data on cars on hand, tonnage on hand and tonnage waiting withheld due to shippers' protest.

Pier and Bunker Prices

	(Per Gross Ton)	
	PIERS	
	March 24	March 31†
Pool 1, New York....	\$5.50@6.00	\$5.35@5.75
Pool 9, New York....	5.10@ 5.45	5.00@ 5.25
Pool 10, New York....	4.75@ 5.10	4.75@ 5.00
Pool 11, New York....	4.25@ 4.65	4.25@ 4.60
Pool 9, Philadelphia..	5.15@ 5.30	5.15@ 5.30
Pool 10, Philadelphia..	4.85@ 5.05	4.85@ 5.05
Pool 11, Philadelphia..	4.45@ 4.55	4.45@ 4.55
Pool 1, Hamp. Roads.	4.50@ 4.60	4.50@ 4.65
Pool 2, Hamp. Roads.	4.25@ 4.35	4.25@ 4.35
Pool 3, Hamp. Roads.	3.90@ 4.00	3.90@ 4.00
Pools 5-6-7, Hamp. Rds.	4.00@ 4.10	4.00@ 4.15
BUNKERS		
Pool 1, New York....	\$5.75@6.25	\$5.60@6.00
Pool 9, New York....	5.35@ 5.70	5.25@ 5.50
Pool 10, New York....	5.00@ 5.35	5.00@ 5.25
Pool 11, New York....	4.50@ 4.90	4.50@ 4.75
Pool 9, Philadelphia..	5.40@ 5.55	5.40@ 5.55
Pool 10, Philadelphia..	5.10@ 5.35	5.10@ 5.35
Pool 11, Philadelphia..	4.70@ 4.80	4.70@ 4.80
Pool 1, Hamp. Roads.	4.60	4.65
Pool 2, Hamp. Roads.	4.35	4.35
Pools 5-6-7, Hamp. Rds.	4.10	4.15

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

Coming Meetings

American Society of Civil Engineers. Spring convention, Asheville, N. C., April 20-22. Secretary, George Seabury, 29 West 39th St., New York City.

American Welding Society. Annual meeting, April 27-29, at Engineering Societies Building, 29 West 39th St., New York City. Secretary, M. M. Kelly, 29 W. 39th St., New York City.

Mine Inspectors' Institute of America. Annual meeting May 3-4-5, Charleston, W. Va. Secretary, C. A. McDowell, P. O. Box 64, Pittsburgh, Pa.

California Retail Fuel Dealers' Association. Fourteenth annual convention, Sacramento, Calif., May 5-7. Chairman of Convention Committee, George Burns, 19th St. between V and W, Sacramento, Calif.

International Railway Fuel Association. Nineteenth annual convention, Hotel Sherman, Chicago, Ill., May 10-13. Secretary, L. G. Plant, Railway Exchange Bldg., Chicago, Ill.

American Mining Congress. Annual convention May 16-20, Cincinnati, Ohio. Secretary, J. F. Callbreath, Munsey Bldg., Washington, D. C.

American Society of Mechanical Engineers. Spring meeting, May 23-26, at White Sulphur Springs, W. Va. Midwest regional meeting at Kansas City, Mo., April 4-6. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

Society of Industrial Engineers. Fourteenth national convention, Hotel Stevens, Chicago, Ill., May 25-27. Executive secretary, E. Van Neff, 17 E. 42d St., New York City.

American Wholesale Coal Association. Annual convention June 1-3, Toronto, Canada. Secretary-treasurer, R. B. Starek, Chicago Temple Bldg., Chicago, Ill.

National Retail Coal Merchants Association. Annual convention June 6-8, Detroit, Mich. Resident vice-president, Joseph E. O'Toole, Washington, D. C.

Association of Iron and Steel Electrical Engineers. Annual convention in conjunction with the Iron and Steel Exposition, at Pittsburgh, Pa., June 13-18. Secretary, John F. Kelly, Empire Bldg., Pittsburgh, Pa.

New England Coal Dealers' Association. Annual meeting June 14-16, Hotel Griswold, New London, Conn. Executive secretary, E. I. Clark, Boston, Mass.

Colorado and New Mexico Coal Operators Association. Meeting at Boston Building, Denver, Colo., June 15. Secretary, F. O. Sandstrom, Denver, Colo.

National Coal Association. Annual meeting June 15-17, at Edgewater Beach Hotel, Chicago. Assistant secretary, J. C. Crowe, Washington, D. C.

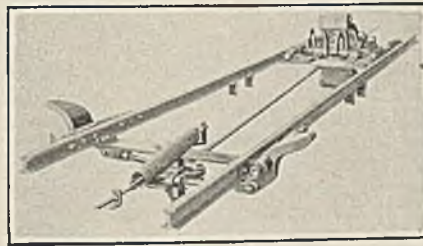
American Institute of Electrical Engineers. Summer convention, June 20-24, at Detroit, Mich. Regional meetings, April 21-23, Bethlehem, Pa., and May 25-27, Pittsfield, Mass. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

Michigan-Ohio-Indiana Coal Association. Annual convention at Cedar Point, Ohio, June 28-30. Secretary, B. F. Nigh, Columbus, Ohio.

New Equipment

Folding Stop Engages Car Bumper in Feeding

The increasing demand for a feeder capable of handling heavy trips on steep grades, especially where car axles are small, has resulted in the development of a new type of automatic feeder brought out by the Mining Safety Device Co. of Bowerston, Ohio. Older types of feeders engage the wheels of the car. Where the cars are substantially built and the correct grade may be obtained, this type is quite satisfactory. There are, however, many mines where better results may be secured by



Stop Catches the Bumper

Holding a trip on a steep grade by means of horns engaging the wheels or a stop catching the axles puts a heavy stress on these parts. The bumper is the portion of a car that is built to withstand heavy shocks and this new device places the stress where it does the least possible damage to the car.

the use of the new feeder which engages the car bumpers.

The machine is designed to feed trips automatically to a cage, dump, chain haul, scale, over a knuckle, to the foot of an incline or at any point where trips are handled. When the dump or other device comes to loading position, the bumper stop is unlocked, and the horns close. The first car of the trip then moves quickly forward folding the bumper stop, which drops to a position below the bottom of the car and is there locked in place. The car moves toward the dump and when its rear bumper is clear of the stop, this is unlocked and returns to its holding position. At the same time the horns open allowing the trip to advance. These horns are placed within one or two inches of the front wheels of the second car, so the trip, with the exception of the first car, does not move when the bumper stop folds down. In this way no jar is transmitted to the trip, which is simply held at this point until the bumper stop is in position to catch it.

This feeder is substantially built, being assembled on a heavy plate that slides between the rails. On this plate, and also fitted into the web of the rails, are bearings provided with heavy cushion springs. The rails are held in correct position by steel ties while ordinary ties provide a sliding surface for the plate. An anchorage sufficient to hold the heaviest of trips is thus provided.

Various modifications of the machine, adapt it to cages and all types of dumps. The action is free enough to permit easy operation by hand. In cases where the car bumper is double or divided a divided stop is used. This feeder has been tried out by the manufacturer who claims that its operation is highly successful.

Czechoslovakian Firm Offers High Grade Steel

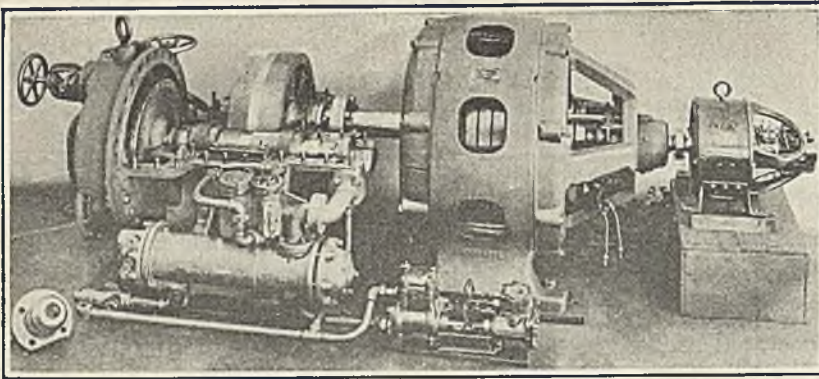
The Poldi Steel Corporation of America, with headquarters at 151 Bank Street, New York City, announces that it is now prepared to offer a special and improved quality of hollow and solid mining drill steel as well as cutter bits manufactured exclusively under a new process by the Poldi Steel Works of Czechoslovakia. This latter firm is known throughout the world as the manufacturer of fine quality tool and special steels.

In the manufacture of Poldi mining drill steels, only the purest of high grade iron made from Styrian ores will be used. The steel is melted in specially constructed electric furnaces and in offering this product to the trade, the claim is made that it will fully maintain the high reputation of Poldi products for uniformity and superior quality. All standard sizes and shapes will be supplied in various length bars as required, up to a maximum of 30 ft.

Versatile Gear Turbine Unit Stands Hardest Wear

Turbine units of the backgeared type in ratings from 75 kw. to 500 kw. have been placed on the market by the Westinghouse Electric & Manufacturing Company. These turbines, although primarily intended for driving either alternating- or direct-current generators, may be used to drive practically any apparatus operating at speeds within the range for which the gears are suited. The manufacturers state that these units are compact but accessible, that they are built to withstand the hardest service with a minimum of operating attention and that their steam consumption rate is excellent. The oil-operated governor used is similar to that used on larger Westinghouse turbines and makes it possible for the operator to vary the speed over a wide range while the turbine is in operation.

Space requirements have been decreased by incorporating the turbine and gear in a single casing. The turbine rotor, the blading of which is of the single-row re-entry type, is overhung on the end of the pinion shaft. This arrangement simplifies the design by eliminating all the turbine bearings and one of the glands, as well as the coupling between the turbine and pinion. The turbine when used with a generator is so designed that the unit



Geared Turbine Connected to Generator

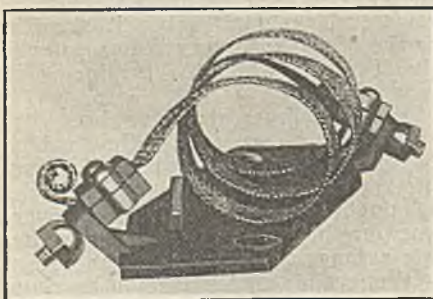
The chief advantages of the turbine are its reliability and small size. Its high rotational speed has been a disadvantage in some cases. Backgearing the turbine to the machine driven obviates this latter difficulty yet permits the turbine to run at normal speed.

may be mounted directly on the foundation, thus eliminating the heavy cast-iron bedplate usually required. The steam chest is mounted directly on the foundation at the side of the turbine. This protects the cylinder casing from stresses imposed by the steam piping. A restraining ring gives the operator the assurance of personal safety in case of accidental extreme overspeeding, because it prevents bursting of the turbine cylinder. This safety feature is provided in addition to the standard overspeed safety governor. The reduction gear is of double helical construction designed so that the same amount of tooth surface is in contact at all times between the gear and pinion.

Support Holds Cable Firmly

It is not always easy to support lead covered cable firmly yet without damage. In order to accomplish this result the W. & G. Electric Specialty Co. of Chicago, Ill., has recently placed on the market the hanger shown in the accompanying illustration. It is claimed by the manufacturer that this support will hold cable of several different diameters either horizontally or vertically without difficulty and without injury to the cable.

Essentially this hanger consists of a base casting provided with a bracket upon either end, and a metallic ribbon that makes several turns about the cable and is fastened to these brackets. Means are of course provided for adjusting the tension on the ribbon so that it will grip the cable firmly. It will be readily seen that this device furnishes a means whereby ready suspension for cables of varying diameters



Simple Yet Effective

The ribbon grips the cable and clamps grip the ribbon at either end and are fastened to brackets. Ready adjustment permits holding cable of several different diameters.

may be had. It will grip the lead sheath without doing it physical injury.

The chief advantages claimed by the manufacturers for this hanger are: It can be used with any diameter of cable; it serves as a ground as well as a mechanical support; it does not interfere with fireproofing the cable with cement; it is simple to install; may be easily taken off when necessary and provides a neat and effective support. In a somewhat heavier construction than that shown it is well adapted to the support of long runs of cable such as are used in boreholes leading to mines.

Seals Against Oil Leaks

A paint which is said to be the only material that effectively seals joints against oil leaks has been developed by the General Electric Co. and is being sold by the Merchandise Department at Bridgeport, Conn. The product, known as G-E No. 880 Red Protective Paint, also prevents water and gas leaks. It can be used for many purposes that now require red lead or white lead, and is less expensive than either.

The paint, which is dark red in color, requires no priming and can be applied by brushing or dipping. Denatured alcohol is used as a thinner. It dries rapidly and produces a hard, smooth, glossy film which is easily cleaned and which prevents excessive collection of dirt and conducting material, thereby decreasing surface leakage and subsequent carbonization of the surface when used with electrical apparatus.

New Companies

Hartman Coal Mining Corporation, New York City, has been chartered at Albany, N. Y., with \$25,000 capital. Waldemar Hartmann, 40 Towerhill Road, Mountain Lakes, N. J.; Joseph McGovern, 154 Prospect Park West, and Allan M. Carson, 55 Hanson Place, Brooklyn, are directors and subscribers. Louis H. Rowe, 25 Broadway, New York City, is attorney for the corporation.

A new company, known as the **North Shore Coke & Chemical Co.**, which will operate as a subsidiary of the North Continent Utilities Corporation under Baehr management, has been organized under the laws of Illinois to construct

and operate a gas and byproducts plant at Waukegan, Ill., according to George M. Forman & Co., bankers for the North Continent group.

The **Garnet Coal Corporation**, Dumbarton, Va., with a capital stock of \$100,000 has been chartered by T. H. Harris, president, and M. O. Harris, secretary.

The **Greenbrier River Smokeless Coal Co.**, Caldwell, W. Va., with a capital of \$25,000, has been incorporated by W. K. Morgan and W. T. Morgan.

The **Mary Francis Coal Co.**, Barbourville, Ky., capital \$75,000, has been incorporated by Mary F. Congleton, Claude Congleton and Isaac Congleton, as an operating company.

The **Cross Creek Coal Co.**, Cleveland, Ohio, has been incorporated with a capital of 100 shares of stock, no par value, to mine and sell coal. Incorporators are H. S. Duffy, R. A. Cannon, H. O. Meirke, Charles F. Ross and J. H. Melcher.

The **Candlewax Smokeless Coal Co., Inc.**, of Tazewell, Va., with capital stock of from \$10,000 to \$50,000, has been granted a charter by the Virginia State Corporation Commission to own, develop and operate coal mines. The incorporators are F. B. Gent, president, Honaker, Va.; M. E. VanDyke, secretary; R. O. VanDyke, both of Tazewell, and G. S. Gildersleeve.

The **Springton Coal Co.** has been incorporated in Evarts, Ky., by Henry Turner and Frank Kelly.

The **Tunnel Hill Coal Co.** has been incorporated in Oneida, Tenn., by A. C. Terry, W. C. Terry and others.

A charter of incorporation has been granted to the **Pittsburgh-Monongahela Coal Corporation**, of Morgantown, W. Va., according to an announcement made by Ernest H. Gilbert of the Gilbert-Davis interests of Morgantown, who said that the new corporation would operate in the Morgantown field. The company has a capital of 10,000 shares of no par value. Other incorporators are E. M. Showalter, Samuel D. Brady, John F. Phillips, all of Fairmont; Samuel Pursglove, of Cleveland, Ohio, and E. H. Gilbert, of Morgantown.

The **Dane Coal Co.**, Iowa City, Iowa, has been incorporated with capital of \$100,000 to mine and sell coal.

Trade Literature

The **Ohio Brass Co.**, Mansfield, Ohio, has issued a folder illustrating and describing its different types of valves.

General Electric Co., Schenectady, N. Y., has issued the following three bulletins: **Automatic Switching Equipment**; **Carrier Current Selector Supervisory Equipment**. GEA-574. Leaflet illustrating and describing application, advantages, power supply and operation of this equipment. **Automatic Control Panels for Industrial Heating**. GEA-594. Illustrates and describes the open and inclosed types. **Medium Speed Synchronous Motors "7600 Series."** GEA-708. Illustrating and describing types TS (3-phase), QS (2-phase), 514 to 900 r.p.m.; 100 to 700 hp.; 220, 440, 550 and 2,200 volts.