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The Greater Force

WHICH section of the country will complete the mechanization of the mines first—the union or the non-union? Will the fear of losing markets and the losses in operation so spur the union operators that they will put in conveyors and loading machines? or will the non-union operators out of their plethora of profits, present and accumulated, and out of their shortage of mine labor lead the way? One is disposed to believe that the union men whose needs are greatest but whose financial ability is least will lag behind especially as the union mine workers are not very favorable to a plan which reduces the force of men necessary for the operation of mines.

Rock Dusting Versus Mine Cleaning

IF coal dust is a source of danger in coal mines, why not meet the difficulty by collecting the coal dust rather than by adding rock dust, is a question one frequently hears. No one can seriously question the importance of suppressing coal dust by every possible means, but the main consideration is, how can we reduce the quantity of coal dust so as to reduce the need for using an unnecessarily large quantity of rock dust? For we cannot hope in any coal mine so completely to suppress coal dust that an explosion of any sort will not be extended by what coal dust is present, provided no rock dust is available to render it harmless.

The anxiety to reduce the quantity of coal dust should not be discouraged however. With great care it may be possible to use a maximum amount of rock dust and just have the dust of the mine continue for long periods of time to be of an incombustible character. The devices suggested for collecting coal dust will enable the mine to be prepared for stone dusting without danger. A forcible spray can be used for washing down ribs and timbers, or a vacuum cleaner can be devised for collecting the dust from these places. The dust swept down by the spray can be scraped and swept from the floor and shoveled into cars. The dust collected by vacuum cleaners can be allowed to settle in a container. When the rock dust is distributed it will fall on clean surfaces and consequently will be deposited almost without contamination.

A dry mine with the rock dust thoroughly desiccated may be safer than a wet one, for the rock dust will be ready to rise and extinguish the flame. A wet dust might be disposed to rise in smaller volume with less effect. In any mine the dust on the ribs and timbers will be most dangerous, if the dust of coal, and the most helpful in suppressing an explosion, if the dust of rock. It is likely to be drier and therefore readier to act. In a mine that is properly rock-dusted, it will be cleaner than the dust on the floor, and in one that is not thus treated it will be by reason of its freedom from incombustible material, its dryness, its fineness and its position, the most dangerous dust of any. The rib and

timber dust, small though it is in quantity, is most in need of treatment.

In the Cross Mountain Mine, in Briceville, Tenn., it was noted at the time of the explosion that the coal dust on the floor was of considerable depth, the cars having no end gates. The large quantity of dust, however, probably made little difference, for almost every mine not treated with rock dust or fairly drenched with water can sustain an explosion. Such a little dust is needed that no mine is safe however carefully cleaned, if it is not guarded by rock dust, for the drenching it gets is almost never sufficient for protection.

Missions Worth Supporting

THE movement now well under way in Kansas City for the creating of an active and virile "coal institute" is commendable. Such an organization, if it is backed by the right spirit among coal producers and retailers and if it is manned with men of the right caliber, can go a good way toward setting the public mind aright about coal. Organizations of that sort in most of the large cities of the country can benefit the entire coal industry. But to do this thing, they must sincerely and intelligently aim at real service to the coal consumer of the land as their one and only reason for existing. The benefit to the coal men will follow naturally and deservedly.

There is much service that such an institute can render to a community. Take Kansas City, for instance. Oil competition there is at its keenest. Coal has suffered heavily by that fact. Thousands of coal grates have been replaced by oil burners during the past four years within the district. In some instances, it must fairly be admitted, the change was for the better. It was logical and economical. But in scores of others, the change was bad economy and was made merely because a wave of oil burning was sweeping the community. A coal institute, active and possessed of public confidence could have prevented the shift. It could have so improved the use of coal by prospective oil consumers that coal would have held the market to which it was entitled.

It is a fact that the average household furnace wastes a full 60 per cent of the fuel value of the coal it consumes, partly by reason of bad equipment, partly because of improper maintenance and largely because of plain ignorance on the part of the householder. It is no wonder, therefore, that dissatisfaction with coal is often widespread. Coal consumption in larger heating plants is only a little more efficient and among power plants fuel wastes are tremendous as every well-informed combustion engineer knows. There are things to be done about this. No agency would be in a better position to do them than the community "coal institute." But that institute must be free to do its work in an unbiased, broad-visioned way with the people's interest—not the coal man's—first. Only by that

713

means can it win public confidence and only with public confidence can it accomplish anything. Its whole object should be merely to give coal a fair chance at the hands of the people. Having done so, it will have established a new and friendlier relation between coal and the public.

Dressed Up and Nowhere to Go

WHY all the insistence in favor of a Department of Mines? Organs are created for the purpose of performing definite functions, but no one has as yet found a function for a Department of Mines. Why reverse beneficent nature and make an organ for which no function has as yet been found? Certain it is that nature will not permit any such anomaly. The department, if formed, will find a function. It will not live in a vacuum. It will have to discover a reason for existence or die. The politician who heads it—and it will be a politician—will find something to do. Will that something be helpful or harmful to the industry? We fear it is most likely to be the latter.

The Department of Agriculture has been a helpful agency for the farmer. It has always been headed by a farmer-usually a real "dirt farmer" at that. The farmers see to that and they are powerful enough to get just what they seek. How long would the head of the department, the Secretary of Agriculture, last if he placed the interest of the public above the interest of the industry? Not a day. He is supposed to clamor and he does clamor for higher prices for the agricultural interests. On the whole the farming industry has a difficult time and needs help. It gets it, however, not because it has a Secretary of Agriculture, but because it controls that Secretary and because it can direct legislation. Farming has a dominant political influence. What is true of farmers and labor is not true of any other groups of individuals.

It is quite likely that a Department of Mines would be a corrective body. It probably would be regarded as the department of correction of the mining industry. It would be headed by someone who was not a mining man. The chairman of the committee on Mines and Mining is quite usually not a mine owner. He is looking after the supposed interests of the public, and he is disposed to believe that this can best be served by a further control of the mining industry. It is likely that this will be true of the Department of Mines if it be formed.

The frogs in the pond, says the classical story, cried for a king. They were tired of being ruled by a log which lay on the edge of the domain in which the frogs lived and croaked. The gods heard the plea of the frogs and sent them a fine outstanding fellow for their king—a long-legged, attractively appareled stork. They were rapt in admiration till presently the stork began to swallow up the denizens of the pond, one by one. Then they began to wish they had not importuned the gods and had been content with the log, which though unsightly and supine, did none of them any harm.

To what end shall we then pray Congress to send us a king? We are told his presence in the Cabinet will give the industry a standing comparable with its importance. Metal men may desire the public to recognize them, but the coal men long ago ceased to tell the public how important they were and how essential to public well-being, for they well know that the people have always a desire to regulate any essential industry and do it by cutting down excessive profits and by ignor"all dressed up with no place to go," but not for long; in a short while he would be regulating every detail of the industry. Mining has suffered already so much that it is to be hoped it will suffer no further interference, except as to increased safety, and that perhaps is best provided by state regulation.

Safe Gas Limits

A^T last comes a protest against Professor Wheeler's remarks at Scranton. The correspondent seems almost to suggest that *Coal Age* should have protested against that authority's conclusions and perhaps should not have quoted them.

We are quite willing to say that men should not be allowed to work in a mine for the purpose of getting coal where the content of methane in the return is $4\frac{1}{2}$ per cent. Whether they would be justified in sealing in a fire where such a percentage is found in the return is entirely another matter. In such a case the opening of a door is not so much to be feared as in an operating mine. A sudden outburst of gas is not as likely to occur in such event as in a mine where men are advancing faces. A fall of roof might baffle ventilation. The fan might stop. These contingencies are more remote and in all kinds of fighting—whether against an army or a mine fire—there is some danger.

We thought Deputy Chief Inspector Walker put the matter well when he said it would be his painful duty to enforce the law and have his colleague arrested if he did not withdraw the men where such a percentage was found. Certainly it was well if the professor would seriously try to continue the extraction of coal for commercial use with such a percentage of methane present.

It is customary for the press to quote the sayings of responsible persons as news, even though it does not agree with them. For instance, Republican papers reproduce the speeches of Democratic presidents and other public men. They are not responsible for what is quoted. Nor are Democratic papers subject to criticism for publishing Republican pronounciamentos.

Some years back we quoted a statement from a reputable German technical journal. This had been quoted in an English Government organ without protest. We gave both publications full credit. That, however, did not save the credit of this journal. It was held that we should have safeguarded our readers by a word of reprobation. We might have done so, feeling the German and British papers were ill-informed on the matter, but thought that such censorship exceeded our duties and that perhaps the German authorities might, after all, be right. The last word has not been said on many subjects.

Some years ago it would have seemed ridiculous, for instance, to use carbon dioxide in the resuscitation of a suffocated man, but close reasoning and experiment have shown that a little of that inert gas stimulates the lungs and, administered with oxygen, greatly increases the rapidity with which the patient is resuscitated. Thus we are always ready to hope that there may be things—good things, of course—"undreamt of in our philosophy," and if the person making the statement is a competent authority, most gladly do we slide the responsibility for the statement on his willing shoulders. So now we say Professor Wheeler said it, not we. Let Deputy Chief Inspector Walker incarcerate his genial colleague and leave us free and blameless!

COAL AGE



Lowering Coal Down Hillsides with Minimum Breakage

Chutes Are Destructive to Coal and Inclined Planes Are Dangerous—Type of Conveyor to Be Chosen Depends Chiefly on Such Factors As Length and Inclination of the Hillside

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THROUGHOUT the Appalachian coal fields a large percentage of the mines have been opened in beds that outcrop on the hills high above the railroad tracks in the valleys. Many of these hillsides are steep, and the problem of lowering the coal from the mine to the tipple, with safety, slight breakage and at reasonable expense, furnishes an interesting study.

Probably the simplest and, from the standpoint of coal degradation, the most extravagant means of getting the coal down the hill is the chute. Where a chute is used, the coal is dumped into it near the level of the pit mouth and runs by gravity to the tipple. The chute must be steep enough to carry damp slack, as well as dry lump. This latter material accordingly accelerates rapidly and in a long chute attains a terrific speed. At the bottom, it is brought to a sudden stop and as a result the breakage is excessive.

Although theoretically a chute may be closed and kept full of coal, a gate being opened at the bottom to draw off the material only as fast as it is dumped in at the top, this is difficult to accomplish in practice. When, however, it is accomplished the coal moves en masse and little breakage occurs. The contents, however, are liable to plug, or arch, and may refuse to run unless the chute is made extremely steep. The cost of building a wooden chute in a proper manner also is appreciable. It is difficult to keep tight, and the maintenance cost is high. The sheet-iron plates lining it are subject to rapid wear and must be either excessively thick or must be renewed frequently.

INCLINED PLANE MUCH USED BUT UNSATISFACTORY

Another device frequently used in lowering coal is the gravity or self-acting inclined plane. Here the loaded cars are lowered either singly or in triple by means of a cable and a drum or a figure-eight plane machine. The loads in coming down pull the empties back up the hill, the system requiring no power other than the force of gravity.

This is a fairly simple arrangement, but it has many disadvantages. In the first place, derailments and wrecks are frequent. If the incline is steep, coal rolls from the tops of the cars and litters the tracks. To avoid this spillage, the cars should not be topped as high as is customary where the coal is transported only on light grades. This reduces the tonnage delivered to the tipple per mine car handled. Where underground haulages are long, one of the chief problems of the mine management is to deliver empty cars to the loaders. If the miner is compelled to put 10 to 15 per cent less coal on each car, the daily output of the mine often will be reduced in almost a like proportion.

Because it is designed to round the sharp curves necessary underground, the ordinary mine car is long in comparison with its wheel base. This permits it to seesaw on the incline, so that it is easily derailed by obstructions or inequalities in the track. Consequently a plane of this kind should be well laid with heavy rails and should be kept clean and in good condition, all of which means expense.

More costly and dangerous than a simple derailment is a runaway of one or more cars down the incline.



Fig. 1—An Inclosed Tubular Coal Chute

The chute receives coal from two levels. It is intended to be kept full of coal at all times the contents being drawn off at the bottom only as fast as it is dumped in at the top. This entails little breakage but the chute is liable to plug either from bridging or arching of lumps or from freezing in cold weather.



Fig. 2-Gravity Plane Just Completed

This plane is evidently intended for lowering mine cars as no provision has been made for discharging gunboats at its foot. Lowering the cars themselves entails less first cost but a greater liability to accident from both derailments and runaways.

This may result from broken couplings, defective attachment of the rope to the leading car, failure of the top men to properly couple the trip together, or attach the rope to it, or from other causes. Pushing cars over the knuckle without attaching the rope to them at all is not an infrequent occurrence. An accident of this kind may completely wreck the tipple, cause loss of life and tie up the entire mine operation for a long period. To lessen this danger, safety switches should be installed and their use, by the man responsible for their operation, should be rigidly enforced.

WITH INCLINE, TOO MANY MEN ARE NEEDED

Another objection to this method of handling coal is the fact that a large structure is necessary at the foot of the incline in order to accommodate the empty and loaded trips, as well as to permit of dumping operations. Furthermore—and this is important—a large labor force is requisite to handle the head and tipple ends of such an incline. A considerable saving in labor may be effected by installing a rotary dump at the foot of the plane, which will discharge an entire trip without disengaging it from the rope.

This, however, entails a large investment. With a rotary dump such as has just been suggested, either a storage bin is necessary, which would entail a certain amount of coal breakage and which must be set at such an elevation as to permit a gravity feed to the preparation screens, or the coal must be raised from the lower portion of the bin to the screens by a conveyor. If coal is to be weighed, as is frequently the case, another problem is introduced. Furthermore, if the mine sends out cars of slate or other refuse, these should be cut out of the trip and their contents dumped from some point on the hill at the top of the incline.

To avoid the difficulties inherent to lowering coal down the hillside in mine cars, the monitor or gunboat plane has been introduced. This obviates some of the evils just mentioned, but introduces others peculiar to itself. To get a large tonnage, the monitor must be of large capacity. Monitors are, therefore, usually built to hold from 6 to 10 tons of coal, depending on the length of the incline and the output of the mine. About one minute should be allowed for loading each monitor and the speed of lowering is determined by the length of the incline, the quality and condition of track and equipment, and the relationship of the grades at the head and foot of the incline. A fair speed is about 10 miles per hour.

MONITORS STAY ON TRACK BETTER THAN CARS

Monitors should be heavily and substantially built. They are of longer wheel base than mine cars, and larger wheels are provided. Consequently they are less readily derailed. They are constructed to suit the inclination of the slope over which they operate and there is much less spillage along the track. Nevertheless, if the incline is steep at the loading point, as it frequently is, lumps very often roll off during the loading process to catapult and ricochet down the slope, endangering the lives of all who may happen to be near the track.

Because of the weight of a monitor and the coal it contains, the track must be substantially built and well maintained. On steep inclines, it must be anchored at intervals to prevent down-hill creep. The rope necessary for monitor operation is heavy and expensive. To prolong its life as well as to prevent the ties from being sawn in two by it, slope rollers should be placed at frequent intervals. These are subject to heavy duty on long inclines, particularly if the slope contains a hump or convex curve. They should therefore be substantially constructed and fitted with good bearings, which should be kept lubricated. Dirt, rock and coal periodically should be cleaned away from them, so as to allow them to revolve freely. If a roller ceases to turn, the rope soon cuts a flat place in it and it is ruined, requiring repair or renewal. The maintenance of track rollers is consequently an item of expense in plane operation, whether monitors or mine cars are used.

As previously stated, however, derailments are far less frequent with monitors than with mine cars. Furthermore, the rope is not disconnected from the monitor except for replacement or resocketing, or for the renewal of connection parts. As a result, if the rope and its connections are carefully inspected, there is small chance for a break-away. Should such an accident ocour, however, it is liable to be far more serious than with mine cars, as the monitor is much more likely to hold the track and play havoc with everything at the foot of the plane. Both empty and loaded monitors pull simultaneously against the drum or head sheave, so that it must be made heavy and strong, and securely anchored to a massive foundation.

Loading of monitors is an intermittent operation,

FIG. 3 **Belt Conveyor**

Belt Conveyor Belts are excellent means of convey-ing coal on the level or down slight inclinations. They also may be carried easily over changes of grade. About 18 deg. is the maximum in-clination on which a conveyor of this kind may be em-ployed, as on steeper pitches the coal tends to roll on the belt. On grades exceeding about 6 per cent c on ve y or belts which transport material down hill tend to run away and means must be employed to hold them. them.



that is, 6 to 10 tons may be taken from the bins every two to three minutes. Accordingly, bins of at least this capacity are required at both the head and foot of the incline. This adds to plant investment and increases both fire hazard and coal degradation. With a monitor plane, coal is subjected to breakage three times—in dumping into the upper bin, discharging from the bin to the monitor and again discharging from the monitor into the lower bin. At the upper end of the incline, the bin is provided with gates for loading the monitors.

These may be automatically opened and closed by the monitors themselves, or they may be manipulated by the drum man, thus saving operating labor. At the lower end, the monitors discharge automatically. If coal is screened, it must be drawn from the lower bin and fed uniformly by a mechanical feeder, in order to secure effective sizing. In many instances, also, in order to obviate a high bin structure and its approach, the coal is elevated from the lower bin gate to the screen.

One other operating disadvantage of the monitor system, and this also applies to the mine-car gravity plane, is worthy of mention, namely, the high maintenance of brake linings on drums or plane machines serving long inclines where the duty is heavy. To reduce excessive wear, a stream of water is sometimes kept playing on the brake band and lining to prevent burning. The solution resorted to by one drum runnerputting oil on the brake band to stop the squeakingis not to be recommended, as his experiment cost his company some thousands of dollars for cleaning up wreckage and repairing the damage done at the foot of the plane.

To obviate the many disadvantages of the various systems above discussed, the use of conveyors for lowering coal down hillsides is rapidly gaining favor. These devices are gradually displacing the older means employed. The conveyors generally used and those about to be discussed are of four types, namely, the belt, pan, scraper and rope-and-button conveyors.

Belt and pan conveyors differ markedly from the other two types in that the coal is actually carried by them. The force thus resisting material movement is that of rolling friction only, which ordinarily runs from 5 to 7 per cent of the weight carried. This resistance applies both to the moving parts of the conveyor and to the coal transported. On the other hand, the scraper and rope-and-button conveyors each drag the coal in a trough, so that the sliding friction of the coal on steel is introduced. This ordinarily ranges from 40 to 50 per cent of the weight.

In the scraper conveyor the steel flights are held clear of the trough, so that the moving parts of the mechanism are subjected to either rolling or sliding friction, which kind of resistance it is, depending on whether the conveyor travels on rollers or slides in steel guides. The friction of the conveyor alone is therefore from 6 to 10 per cent. With the rope-andbutton conveyor, the moving parts are subjected to sliding friction—the friction of cast iron on steel which is about 25 per cent of the weight. These basic differences in the forces resisting the movement of the different types of conveyors determine in a large measure the conditions to which each is best suited.

The belt conveyor is particularly adapted to moderate slopes, or to irregular profiles where a portion of the conveyor is horizontal or even upgrade. The friction resistance is low and the power consumption less than that necessary for the other types. On steep grades this factor has no advantage and, in fact, becomes a detriment because of the braking needed to control



Fig. 4—Beaded Pan Conveyor

Conveyors of this kind must be run slower than belt conveyors but by the use of side plates the coal may be piled so deep that their capacity will equal that of a belt. The many links, rollers and wheels employed require frequent lubrication.

the loaded conveyor, unless the linstallation is big enough to justify the provision of some electrical device to utilize the power generated.

Essentially, the belt conveyor is a high-speed machine as compared with the other types and, without discharging the coal too violently, may be satisfactorily operated at speeds up to 400 ft. per min. At such a speed, however, especially if coal is piled in the center of the belt, it is not adapted to the picking of refuse. This type of conveyor has a long life, is low in upkeep and maintenance, and highly satisfactory in operation. It is, however, costly to install. This is especially true if it handles only small outputs where the width of belt is governed not by the capacity desired, but by the size of the lumps to be carried. At present, the cost of a 36-in. belt conveyor per foot of distance between head and tail pulleys, including the troughing and return idlers but without the supporting structure, will run about \$14 to \$18, depending, of course, on the number of plies in the belt, the thickness of the protecting rubber cover, the brand of the belt, etc. A conveyor of this type and width, however, may be made to carry as much as 400 tons of coal per hour.

veyor would be only about 8 in. Per foot of length between centers of head and tail sprockets, a pan conveyor will generally cost 25 to 50 per cent more than a belt conveyor of the same capacity, provided the belt conveyor does not have to be made excessively wide in order to handle large lumps.

Ordinarily the pan conveyor is carried on rollers placed on a pitch of from 8 to 18 in. For extremely heavy duty, however, this pitch may be increased to 24 in. This construction entails a large number of wearing parts—pins and bushings—that must be lubricated. The rollers, however, move at slow speed and if provided with grease chambers require lubrication at intervals of about three or four weeks. The entire equipment is of rugged design and construction and with proper care its life compares favorably with that of the belt conveyor.

It might appear from the above that a pan conveyor is not as good an investment as a belt. Under certain conditions, however, it possesses some distinct advantages, particularly where the distance between centers is comparatively short. Again, it may be employed to carry coal down much steeper inclines than the belt.



FIG. 5 Retarding Conveyor

This conveyor, like the chute shown in Fig. 1, receives coal at two points. As the coal is dragged along a trough by flights attached to the lower strand of chain this can be easily done without appreciable breakage. Scraper conveyors like this may be made to follow fairly abrupt changes of grade or direction of travel.

The pan (or apron) conveyor consists of overlapping plates or pans attached to steel links which are carried by rollers running on a track or a guideway. This type of conveyor requires a little more power than a belt, but this is no disadvantage in an installation where the grade is over 5 or 6 deg. The pan conveyor is a slow-moving machine and should not be run over 100 ft. per min., and preferably at about 80 ft. per min., the speed depending somewhat upon the pitch of the conveyor chain and the diameter of the sockets. By using high sides on a conveyor of this kind, the coal may be piled upon it and large capacity obtained with comparatively small width even at the slow speed necessary with this type of machine. Because of its slow speed, refuse may be picked from it as it conveys coal to the tipple, particularly if a screen or set of fingers installed at the feed end places the fine coal beneath the lump.

Taking as an illustration the 400 tons per hour mentioned under belt conveyors, a pan conveyor 48 in. wide and traveling 80 ft. per min., would carry this quantity of coal in a bed approximately 11 in. deep. At a speed of 100 ft. per min., the thickness of coal on the conIt is not, as a rule, advisable to install a belt conveyor on an inclination of more than 18 deg., whereas a pan conveyor, particularly of the reverse beaded type, will satisfactorily transport coal down a 30-deg. incline. The pan conveyor also may be carried over sharp vertical curves. A common example of this characteristic of the pan conveyor is seen where it is brought down a steep incline and then broken sharply into a horizontal run to the discharge point on the tipple. Furthermore, as already stated, it may be used for picking refuse from the coal.

The scraper like the pan conveyor is carried on chains. In down-slope installations, however, the rollers are often omitted, either the links themselves or the lugs attached to them sliding along steel guides. Grease may be applied to these guides to reduce friction and wear. The omission of the rollers simplifies the lubrication problem, as the only turning of the pins in their bushings is performed while the chain is passing around the head and tail sprockets. This amounts to only a fraction of a revolution. Like the pan conveyor, this type may be carried over sharp curves.

Because of its greater frictional resistance, this type

of conveyor is better adapted to slopes of from 15 to 35 deg. It may, of course, be used on lesser inclinations, but requires more power which in turn means heavier driving machinery and bigger pins and links. On wide conveyors, or where the drag is heavy, the scraper flights must be strong and well stiffened with angles or heads to prevent bending in the center.

In a conveyor of this kind, the coal is generally carried on the lower strand. For this reason, it can be discharged into chutes without appreciable breakage. It may also be discharged at various points by merely opening or closing slides or valves in the bottom of the trough. In some cases, this is an important consideration as for example, in distributing coal throughout a bin with a minimum of breakage. Degradation of coal in transit is insignificant. As the trough plates wear extremely smooth there is only a small percentage of coal in contact with them and the abrasion is accordingly slight.



Only comparatively small timbers are necessary in a structure of this kind. As will be noted the largest ones shown in this drawing are 10x10 in. and 8x12 in. The side walkway is not infrequently carried along one side of the conveyor only.

The scraper conveyor travels slowly, generally at from 60 to 80 ft. per minute. It is not, however, adapted to the picking of refuse. Its cost usually ranges between the cost of a belt and that of a pan conveyor. It is difficult to compare the normal life of any of the various types of conveyors, except in a general way, as conditions and the care given the equipment vary materially. Under similar conditions, if the care given these machines is equal, the scraper conveyor should have about the same life as the pan conveyor, except that the trough plate may need renewal before the rest of the equipment, this, of course, depending upon the thickness of the plate used in the first place and the abrasive qualities of the coal handled. Although such conveyors have been installed on inclines 500 to 600 ft. long, they are not well suited to these lengths. This is because of the large number of joints that must be kept up, the size of the links and pins necessary to carry the load and the difficulty of keeping the two strands of chain of equal length.

The rope-and-button conveyor consists of cast-iron



Fig. 7-Cross-Section of a Scraper Conveyor

The construction used in this gallery is quite similar to that shown in Fig. 6. As conveyors of this kind can be made to follow approximately the contour of the hillside timbers in the supporting bents are seldom larger than 6x6 in.

buttons or disks clamped to a steel wire rope, thus forming a single-strand, endless conveyor passing over a sheave at either end. The buttons move in a U-shaped, plate trough, the lower strand as a rule carrying the coal. Head and tail sheaves are provided with pockets spaced according to the pitch of the buttons on the rope. Into these, the buttons drop, the hubs being engaged by the edge of the pocket which serves as a sprocket. The diameter of the sheave is made to suit the size of rope used, which in turn depends upon the stresses encountered in the conveyor line. The sheave at the upper end of the line is made the drive sprocket because of the difficulty encountered in taking up slack in the line if the tail sheave with its take-up bearing were located at the upper end.

This type of conveyor is the simplest and cheapest of the four varieties here considered, provided the length is approximately 150 ft. or more. The higher cost of sheaves and driving machinery forces the price up on short installations. In first cost, the rope, buttons and troughing for both strands will average from \$5 to \$6 per foot of center-to-center distance between head and tail sheaves. To this must be added the cost of the sheaves themselves, together with their shafts,



Fig. 8—Sections of a Rope-and-Button Conveyor

This well illustrates the simplicity of gallery construction. Unlike the other conveyors this type is not well adapted to follow sharp vertical curves. It can be carried however over gradual changes in grade.



Fig. 9—Head Sprocket and Drive, Button Conveyor Note the rollers on the sides of the button pockets in the driving sprocket. These engage and release the hubs of the buttons without shock or "grabbing." The drive of this type of conveyor is always placed at the upper end.

bearings and driving machinery. Maintenance and upkeep cost is low. The rope is subjected to only slight wear and its life is long.

An improved type of drive sheave places the load on the entering buttons with a minimum of shock, so that breakage of buttons or their slippage along the rope is minimized. Buttons are rarely broken and are cheap to replace should such an accident occur. When a button breaks, however, it does not interfere with the operation of the conveyor, as it is the rim portion that gives way and not the hub. The trough of this conveyor lasts for several years, its life, of course, depending upon the thickness of the steel plate, the tonnage handled per year and the abrasiveness of the material carried. The total tonnage transported over a given trough lining will also depend upon the average loading per hour, as the wear on the lining over any given period of time will be little more when moving 400 tons per hour than when operating at a 200-tonper-hour capacity.

The labor necessary for operating a conveyor of this kind is a negligible quantity. No lubrication is required on the conveyor line, the head- and foot-sheave bearings and the driving machinery being the only points where lubricant is applied. By means of pushbutton control, the motor driving the conveyor may be started and stopped at the tipple or head-house as desired, and the feeder drive is ordinarily connected to, and operates in, conjunction with the conveyor drive.

Like the apron and scraper type, the rope-and-button conveyor runs at slow speed, generally about 80 to 100 ft. per minute. It is not particularly well suited for use in picking refuse from the coal, as the material is carried at considerable depth in the trough. At some installations, however, a part of the slate is removed by pickers stationed alongside the conveyor line.

Coal traveling in the lower trough may be discharged with minimum breakage and without spillage by the use of gates in the trough bottom. Discharge may be made at various points, just as with the scraper conveyor. As the coal lies fairly deep in the trough, only a small percentage of it is in contact with the plate. It is therefore transported practically without breakage. On steel trough plates worn smooth by use, therefore, degradation arising from friction of the coal in contact with the plates is negligible.

The rope-and-button conveyor differs from the apron and scraper types in that it cannot be run over sharp vertical curves. A convex curve or hump adds to the wear and drag of the conveyor, and a concave curve must be so designed that all points in the trough are well above the catenary that the rope and buttons would assume under conditions of maximum stress.

A properly designed concave curve is in reality advantageous, as it tends to equalize the pressure of the buttons on the trough lining throughout the entire length of the conveyor and thereby equalize and reduce the friction and wear. A curve in the conveyor line, however, adds somewhat to the labor cost of erecting the gallery and to the engineering work in both field and office for the trough must be at the proper elevation throughout the bend.

The rope-and-button conveyor finds its greatest field of usefulness on inclinations ranging between 15 and 35 deg., particularly on long conveyors. On moderate slopes, the friction of coal and buttons in the trough increases the power consumption and the tension on the rope. There is, however, no fixed angle under which it may be said that this type of conveyor should not be employed, but the weight of coal handled per hour, the length of conveyor and other factors must be considered. Long installations of this kind have been made embodying vertical curves in which the lower portion of the conveyor even approaches the horizontal.

There is also no fixed maximum inclination beyond which it may be stated definitely that a rope-and-button conveyor is impracticable. On slopes exceeding 35 deg., however, coal lying in the trough above the buttons is liable to roll and flow upon itself. For this reason, it is well to run a steep conveyor at maximum speed.

The ideal condition for a rope-and-button conveyor is to have a slope of about 26 deg. At this inclination, the loaded conveyor is approximately at its point of equilibrium, that is, it is neither consuming nor generating power. This critical angle, however, cannot be fixed definitely, as it will vary with the loading of the



Fig. 10—Tail Sprocket at Conveyor Foot

The cable here traverses a sheave provided with pockets for the reception of the buttons. Takeups are always placed at the for of the conveyor as otherwise they would be difficult to operate. The head shaft, drive machinery and tail shaft are the only places on a conveyor of this kind that require lubrication.



Fig. 11-Trough, Cable and Buttons

Coal may be piled well above the top of the buttons and yet be transported with ease. When a button breaks it is the rim, not the hub, that gives way. As a result this makes little differ-ence in the o eration of the conveyor and repairs may be made when opportunity offers.

conveyor, the physical characteristics of the coal and the condition of the trough lining. Again, a conveyor on a 26-deg. slope may develop power when moving coal at the rate of 400 tons per hour and consume power when operating at the rate of 100 tons per hour.

The capacity of a conveyor of this kind may be extremely large. In fact, on an ideal inclination, no limit can be set, for the coal acted on by the buttons will carry forward the material that is piled in the trough above them. On inclinations greater than 30 deg., the movement of the coal upon itself will cut down the depth to which the conveyor may be safely loaded. This also limits the capacity so that, as previously mentioned, a steep conveyor should be run at maximum speed so as to reduce the volume of coal carried per lineal foot of trough.

Where the inclination of the conveyor is such that

it becomes self acting when loaded, a brake must be provided to absorb the power generated and control the speed of the conveyor. The most satisfactory arrangement of this kind is a brake pulley carried on a countershaft mounted in floating bearings. This arrangement allows the pulley to run free of a stationary brake block when the drive is from the motor, but draws the pulley back against the block when the driving power comes from the conveyor. Worm gears also have been used in drives of these machines, and, of course, are arranged so that they lock themselves when the power fails. A solenoid brake may be provided to stop the conveyor in case of power failure, but such a device takes hold suddenly and throws a shock into the conveyor line that may prove damaging. The automatic brake first mentioned takes care of power failure without introducing this sudden shock.

Conveyor galleries are frequently built of wood as the fire hazard entailed by this construction is not as great as that at tipple or headhouse, and their life is fairly long. They may, of course, be constructed of steel, particularly if for topographic reasons long spans between supports are necessary. It also may be advisable to use steel bents and long spans if the hillside is subject to slip and points of solid anchorage are difficult to obtain.

A wooden gallery for the various types of conveyors above described, including a walkway on one side, will require approximately 60 to 75 board feet of lumber above the supporting bents or towers for each foot of conveyor length. Bents are usually so spaced that 16- or 18-ft. stringers may be used. As a result, the load upon any bent is not great and 6x6-in. legs are commonly used, except for high bents. Even if the conveyor is high above the ground, this size of lumber may be used if resort is made to tower construction.

Galleries are usually provided with a walkway along one side of the conveyor only. They may be left opensided if the climate is not severe, though it is usual to inclose at least one side, ordinarily that next to the conveyor so as to reduce the quantity of rain and snow blowing in upon the belt, chains or cable. The ropeand-button conveyor requires less protection than any of the other types.



FIG. 12 **A Long Conveyor**

To such conditions as those here shown the rope-and-button conveyor is particularly adapted. The slope of the hillside is almost ideal for this type of installation as a concave curve somewhat flatter than the catenary that the cable and buttons would assume if hanging freely is best suited to reduce friction and equalize wear.

Selecting the Best Type of Motor for Driving a Mine Fan at Variable Speed

Fan Speed Often Decreased at Nights and on Holidays or During Development—Large First Cost Justified When Energy Charge Is High—Motor Should Operate at High Efficiency and Slow Speed

> BY B. W. CHADBOURNE General Electric Co.

EXAMPLE 1 LECTRICALLY operated mine fans are usually direct-connected, belt-, gear- or chain-driven. Many years ago most of the fans were belt- or chain-driven, but now fans are frequently directly connected to their motors. This change is due to the extended use of automatic starters, and also to the fact that there is a tendency for a belt to slip off the pulleys when the motor is being brought up to full speed.

At many mines it is necessary to operate fans at constant speed for twenty-four hours per day every day of the week. At other mines the volume of air required varies. A mine in the process of development requires only a small quantity of air but when it has reached an operating stage more ventilation is needed. A non-gaseous mine may require less air during nights and holidays than during working hours. Under these conditions a variable-speed drive is more economical than one that is fixed.

SQUIRREL-CAGE MOTOR IS CHEAP AND EFFICIENT

There are several types of electric motors suitable for driving fans operated at constant speed. Each has some advantages and some disadvantages. When the motor is directly connected to the fan a standard squirrel-cage motor is frequently desirable. It is cheap both as to first cost and operation; it is also simple and the upkeep is small.

The squirrel-cage motor does not operate so success-

fully with a belt drive, because it has a tendency to throw the belt during the acceleration period. For belt drives or for large direct-connected fan units, a wound-rotor induction motor is preferred because with it the acceleration can be made constant.

There are some installations where it is desirable to obtain power-factor correction. This naturally suggests the use of a synchronous motor. A standard-type synchronous motor will not develop sufficient pull-in torque unless the fan is greatly over-motored, therefore it will not bring the fan up to speed unless the airways are closed so as to reduce the load on the motor. This can be done, but it is not desirable to do so. When the power factor needs much correction, an oversize motor can be used, and in that case sufficient pull-in torque can be obtained. This, however, is uneconomical and consequently rarely done. A standard-type motor can be used with a magnetic clutch, but this arrangement is liable to put an excessive stress on the fan.

NEW MOTOR DEVELOPS MAXIMUM TORQUE

To overcome these difficulties the General Electric Co. has developed the super-synchronous motor, which has the stator mounted on bearings so that when the power is applied the stator revolves and soon reaches synchronous speed. The field circuit is then closed, and the motor has synchronous-speed characteristics, that is, it can develop its maximum running torque.



A brake is then applied to the stator and it is brought to rest, the rotor in the meantime begins to rotate and finally runs at synchronous speed. This motor can be used either belted or directly connected to its load. It is especially suitable for direct connection at slow speeds where an induction motor would have a very low power factor. This equipment is more expensive than the squirrel-cage, wound-rotor or standard-type synchronous motor but it has advantages over any of these drives.

When two or more speeds are required it is possible to use a two- or three-speed squirrel-cage induction motor, a wound-rotor induction motor with a regulating resistance in the secondary circuit, a commutator-type brush-shifting induction motor or a direct-current motor. Data are given in this article by which the cost and overall efficiency of these different kinds of drives can be compared.

As nearly all mines are supplied only with alternating current, it is necessary with a direct-current motor



Fig. 2—Characteristic Curve, Typical Mine Fan This fan is designed to deliver 200,000 cu.ft. of air per minute against a 4-in. water gage. When operated at this capacity the fan must be driven by a 350-hp. motor.

to have some device to convert alternating to direct current. A direct-current motor with speed control by armature or field resistance could be used, taking power through a rotary converter or alternating-currentdirect-current motor-generator set. This would require extra machines and a substation. For the direct-current drive therefore we must consider the use of a separate motor-generator with generator-voltage control.

In order to make the various systems comparable, a particular case has been chosen upon which to base all the calculations, namely a fan which must deliver 200,-000 cu.ft. of air per minute against a 4-in. water gage. Incidentally it may be said that the air thus circulated per minute weighs 8 tons or 12,000 tons per day. This work requires a 160-in. fan running at 400 r.p.m. taking 350 hp. For comparative purposes a number of slower operating speeds down to 130 r.p.m. have been chosen arbitrarily.

The results of tests made under the foregoing conditions have been plotted. Fig. 2 shows how the air volume air pressure and horsepower input vary with the fan



Fig. 3—Power Curve of Fan Driven by a Wound-Rotor Induction Motor

It will be noticed from the curves that at slow speeds the power factor of the motor is not good. This is particularly noticeable at speeds less than 200 r.p.m.

speed. In the calculations it has been assumed that the power required to drive a fan varies as the cube of the speed, all openings to the fan remaining fixed.

A wound-motor induction motor rated 350 hp. 400 r.p.m. directly connected to the fan, will meet the requirements. This type of motor complete with drum controller and resistor is simple and will be cheaper than any other drive. It gives seven or eight operating speeds from 130 r.p.m. to 400 r.p.m. and will cost about \$4,700. Fig. 1 shows this type of equipment but with the motor belted to the fan. The power input at various speeds is shown in Fig. 3. The costs given in this and the following paragraphs include boxing, freight for approximately 1,000 miles and installation charges.



Fig. 4—Power Requirements of Three-Speed Induction Motor

The power input, of this type motor is greater at full speed but less at slow speed than for the wound-rotor induction motor. The control equipment is, however, simple. operated. The cost with its control would be \$7,800 or 66 per cent more than for the wound-rotor motor. The power input as compared with the wound-rotor motor installation is higher at full speed but lower at half speed with the inputs identical at about 300 r.p.m. The inputs at the three speeds are shown in Fig. 4.

A commutator type brush-shifting alternating-current motor with a normal rating of 350 hp. at 400 r.p.m. can be operated at any speed down to 130 r.p.m. by shifting the brushes and changing the stator connections from delta to wye. Practically an infinite number of operating speeds are thus made available. Any change in load, such as might be caused by an obstruction in the airway, will have a slight inverse effect on the speed. The complete equipment would cost \$9,400. The power input throughout the speed range is shown in Fig. 5. An installation where this motor was used is illustrated in Fig. 6.

FIRST COST IS HIGHER THAN OTHER SYSTEMS

If a system driven by a direct-current motor controlled by the voltage regulation of a direct-current generator were used this would require a 350-hp., 400r.p.m. direct-current motor receiving its power from a synchronous motor-driven direct-current generator with exciter. The speed of the motor is controlled by adjusting the strength of the generator field. As it is necessary to buy three machines, the first cost, \$13,200, is higher than for any of the systems under consideration. The power input curve is shown in Fig. 7. At full speed it will be noted that the power input is less

Table I—Input at	t Four	Speeds Wit	h Vario	us Drives
	Wound- Rotor	Three-Speed Squirrel-Cage	Brush- Shifting	D. C. with Gen. Voltage Control
400 r.p.m.				
Input kw.	282	294	296	326
Input kva.	367	398	312	
300 r.p.m.				
Input kw.	160	132	140	148
Input kya	255	254	150	
200 r n m				
Innut kw	83	46	45	60
Innut kya	210	163	89	00
130 m				1.4
Input km	53		20	35
Input kwasses and a second second	260		20	,,,
input Kva	200		00	



Fig. 5—New Motor Operates at Good Power Factors The stator of the motor may be connected either wye or delta, by this arrangement it is possible to get a wide speed variation at good power factors. When running near maximum speed the stator winding is connected in delta.

than for either the wound-rotor or the three-speed squirrel-cage motor, but is slightly greater than for the brush-shifting motor. At low speeds its power input is less than that of any of the other types of drives outlined.

There are at least two other methods for driving mine fans at adjustable speed. These are the twospeed wound-rotor induction motor with rheostatic control between the two-fixed speeds and the wound-rotor induction motor with a Scherbius regulating set to control the speed. Both of these systems have a very high first cost and the gain in economy is not large enough to offset it. Therefore, we will not detail the cost or operating characteristics of these two systems.

Table I shows the input in kilowatts and kilovoltamperes for each of the foregoing types of fan drive.

MANY DRIVES USED FOR ADJUSTABLE-SPEED FANS

For mines requiring adjustable-speed fan drives, it is not possible to lay down any general statement as to which method of drive is best, for the reason that no two mines present exactly the same conditions.

We may, however, assume a case in which the fan operates at full speed nine hours per day for 300 days



FIG. 6 Modern Fan Drive

This motor is supplied with automatic speed regulation. The brushshifting mechanism may be controlled from a push-button or pressure regulator. The control circuit transfer switch is shown on the wall.

Table II-Cost of Operation Per Year With Different Drives

	Wound-	Three- Speed Squirrel-	Brush-	D. C. Motor With Gen. Voltage
Fixed charge. Power charge, full speed	\$710 3,850 2,640	\$1,170 4,000 1,460	\$1,410 4,030 1,430	\$2,000 4,450 1,910
Totals	\$7,200	\$6,630	\$6,870	\$8,360

in the year and at half speed the rest of the time. The fixed charge of 15 per cent includes interest, depreciation, etc. There is no penalty considered for the low power factor, and the power cost is taken as a half cent per kilowatt-hour.

Table II, shows that the first cost is not a large item when compared with cost of operation. It also shows that when the operator is not penalized for low power factor, the three-speed squirrel-cage motor is the most economical one to use. However, as this motor has only three operating speeds, it may be necessary to go to the next equipment in order of economy, that is, the brush-shifting motor. If, however, the operator is penalized for low power factor, then the brush-shifting motor or the direct-current equipment would be more economical.

The above data have been compiled not with the expectation that the problem as given would apply exactly to any mine, but to give the underlying principles of operation and with the belief that from the curves and data given, an operator may determine which type of equipment would best fit his particular



As Others See Us

A STATE agent for a large manufacturer of mining machinery had something like this to say on the subject of coal-mining men: "Recently we took on a new line of mine equipment, and, to put our records in shape so that we could give all our customers service and avoid mistakes, we wrote a letter to all the companies who had purchased equipment through the former agent asking that they furnish us with the shop number of the machines that they had in service and also give us the serial number which would allow us to tell the type of machine, as the model had been changed several times. We enclosed a stamped envelope for reply and so worded our letter that all that was required for reply was to insert a few figures and return it.

"We received replies from about one-fourth of the companies addressed. Less than half of the replies were complete and some were incorrect; we had a record of the highest number that had been issued by the manufacturer and thus had a rough check on the numbers sent in. If this information had been of service to us alone, one might have understood the indifference, but the advantage of preventing delays and errors in shipments would react solely to the benefit of the owners of the machines."

A sales engineer for one of the largest manufacturers of electrical machinery recently told me during a con-



Fig. 7—Direct-Current Motor with Generator Voltage Control

This type of drive requires a special generator to supply variable voltage to the fan motor. It is an efficient drive even at slow speeds, but the first cost is usually prohibitive.

needs. These data also have been compiled because there is a growing demand for some better type of drive than the usual wound-rotor motor. In many instances this demand is best met by some type of brushshifting alternating-current motor.

versation that he had come to the conclusion that coalmining men were inclined to be bigots or fools because they rarely were interested in what their neighbors were doing, and in turn they would not allow their neighbors to find out what they were accomplishing if there was any way to prevent it. Most manufacturers when in the market for machinery welcomed information as to the kind of equipment specified by their competitors, and in order to get an order, a salesman usually had to show photographs of his equipment in operation in neighboring plants and have a list of satisfied customers to whom he could refer. But the coal men generally informed him that their problems differed entirely from those of their neighbors and that the experience of the other fellow could have little bearing on the matter.

A manufacturer of mine cars recently took me into his engineering office and asked me to glance over the drawings he had accumulated covering the mine cars he had built for various coal-mine customers over a period of fifteen years. In all that time he had never built cars for two different customers that were exactly alike; as a matter of fact many of them had individually several different styles of cars in use at a single operation. Dozens of times his salesmen had gone to managers who were preparing plans for new operations and offered to furnish them with prints of mine cars used in nearby operations and although sometimes requests had come in for the prints, he had yet to enter an order that would indicate that use had been made of the information furnished. Once he sent out a circular letter to a number of mine managers asking them to explain how they decided on the wheel base for their mine-car trucks and only 10 per cent replied to the letter.

South Wales Coal Region Is Principal Competitor Of American Mining Districts

Extent and Location of South Wales Coal Fields—Classification of the Different Grades of Coal and Their Uses—Difficulties Experienced in Mining and Marketing of Anthracite

BY HORACE WILLIAMS*

OVERING four counties of South Wales and extending into the County of Monmouth, which is administered legally as a part of England, lies a coal field regarding which the information available has been meager. The coal field has an extreme length of 90 miles and a width that varies from 21 miles in Glamorgan County to about 1½ miles in the County of Pembrokeshire where it extends from Abersychan to St. Bride's Bay and continues for an indefinite distance under the sea. Approximately, this field covers an area of nearly 1,000 sq.mi., including 145 sq.mi. beneath Swansea and Carmarthen Bays.

Almost throughout its extent the coal field is bedded on Millstone Grit, beneath which are Mountain Limestone, Old Red Sandstone and Silurian strata. In the extreme western portion, beyond Swansea Bay, however, the Millstone Grit disappears and the coal lies immediately on the lower Silurian formation. The coal field is practically divided into two elongated troughs by an anticline that extends from Pembrokeshire to a point just east of Pontypridd.

COAL RANGES FROM GAS COAL TO ANTHRACITE

Perhaps the most striking feature of the Welsh coal field is the variety of the kind and quality of the coal produced. The product ranges from bituminous to anthracite. The different classes of coal are described as gas coal, heavy bituminous steam coal, smokeless steam coal, bastard anthracite and anthracite. In the Gower area the principal seams around Llanelly and all the seams east of the line from Gowerton to Neath and Merthyr are more or less bituminous. North and west of that line, the same seams are carbonaceous; in the Aberdare and Rhondda districts, changing gradually to anthracite west of the Vale of Neath.

The coal measures may be assumed to have a total thickness of upwards of 7,000 ft., divided into three principal series, namely, "Upper Pennant," "Lower Pennant" and "White Ash." In the eastern portion of the field there are twenty-six seams having a total thickness of 99 ft., and in the western portion there are eighty-two seams presenting a total thickness of 182 ft. In each instance, however, the thickness of workable coal is much less than that just given. There are approximately 670 collieries, large and small, in South Wales, employing nearly 270,000 men. About four-fifths of the workers are engaged underground and the rest on the surface.

Much can be said regarding the superior quality of the Welsh coal. Experiments made for the purpose of testing the rate of deterioration of the Welsh coal under severe conditions of storage have proved that it does not lose its properties during extended periods. It

Table I—Estima Diffe	ted Tonnage, F rent Classes of	Percentag Welsh C	e and Uses of coal
Kind of Fuel E	stimated Tonnage	Per Cent	Uses
Bituminous	8,618,688,965	30.42	Domestic, manu- facture g a s, c)ke, etc.
Anthracite Steam (Western	6,310,292,214	22.27	Malting, hop dry- ing, lime burn-
Division)	4,076,424,971	14.38	ing, gas power, steam raising and domestic use.
Semi - bituminous or second - class			
steam	5,393,724,590	19.04	Stationary engines, bunkering steam vessels
First-class steam	3,936,657,410	13.89	Supplying Admir- alty.
Total	28,335,788,150	100.00	-

is this quality that has earned for it a reputation of being the best coal in the world. A true anthracite from this field can be stored indefinitely and the briquetted fuel manufactured from the coal loses none of its properties over a long period of years.

An estimate of the contents of the coal field is given in Table I, showing the uses to which each grade or class of coal is best adapted.

The selection by the Admiralty of the coal from the deep mines of the Rhondda Valley for the consumption of the British Navy shows the high esteem in which this coal is held. It has been claimed that this coal enables ships at sea to travel at a higher speed than when supplied with any other coal. That fact, however, does not give the South Wales coal any real monopoly, and the competition between the Cardiff and the Newcastle coals has always been active. It was in the year 1881 that shipments from the Bristol Channel ports first exceeded those from the northeastern ports. In that year the coal exported from the South Wales



South Wales, the Leading Coal Field of the United Kingdom The principal mining counties are Glamorgan, Monmouth, Caermarthen and Pembroke. Monmouth is markedly Welsh (that is, British) in its population but English in its name and in the administration of its courts. In popular estimation it is a part of Wales.

[•]Great Western Rwy., Swansea, Glamorganshire, South Wales. England.

district exceeded that from the northern district by a half-million tons.

The development of the coal industry in South Wales and the expansion in its export trade is shown by a comparison of the total tonnage mined and the export shipment for the year 1874, as compared with similar data for the year 1915. In 1874, the mines in South Wales produced 16,000,000 tons of coal, as compared with 57,000,000 tons, in 1915. Again, the exports, in 1874, amounted to 4,000,000 tons, as compared with 30,000,000 tons, in 1915.

In the classification of the South Wales coals as "steam, bituminous and anthracite," given in Table I, it is estimated that the steam coal constitutes between 45 and 50 per cent of the workable seams; the bituminous coal, between 28 and 32 per cent; and the anthracite, between 20 and 24 per cent. The bulk of the steam coal is exported and by far the greater proportion of this is used for marine navigation. For that reason, the South Wales coal holds a leading place among the fuels supplied to ocean steamers at the various coaling ports.

The more bituminous coals, particularly those produced in the Monmouthshire district, are extensively used by railways in the operation of their locomotives. Again, those grades having the highest percentage of volatile matter, amounting in some cases to nearly 30 per cent, are mostly used in the production of gas and the manufacture of byproducts. The anthracite grades are consumed largely in malting, production of gas, cement manufacture and domestic heating. Some of these possess as much as 87 per cent of fixed carbon.

SIXTY COLLIERIES PRODUCE ALL ANTHRACITE

At the present time, the anthracite production is confined to slightly more than 60 collieries, located within a belt of 30 miles. Though a few of the larger collieries produce 700 tons of coal a day, the average output of these mines will range from 200 to 300 tons a day and a number of the smaller mines do not put out more than 50 or 100 tons per day. Until recently, most of the anthracite operations have been confined to drift or slope openings along the outcropping of the seam. All the collieries have grown from small beginnings to their present magnitude.

Today, there are few shafts of any considerable depth but the future expansion of anthracite mining will involve deep shafts and the investment of larger capital. From an annual output of 1,500,000 tons of anthracite thirty years ago, the production has steadily advanced, till in 1923 the production of Welsh anthracite reached 4,333,187 tons, except for a slight diminution during the years of the war.

Until about twenty years ago, the anthracite industry in South Wales was by no means successful and more money was lost than was made in the operation of the mines. In competition with Continental coal, in those early years, South Wales anthracite had to be sold at a low price, and the mines had great difficulty in keeping going. About that time, however, the introduction of what was known as the "Suction Gas-Power Plant" caused an increased demand for anthracite. These plant3 produced as much power from a ton of anthracite as was obtained by the consumption of ten tons of steam coal burned under a Lancashire boiler. This use of anthracite, in "Suction gas plants," marked the turning point in the history of the South Wales industry.

In most of the operations, the roof overlying the coal is difficult to support, and much timber and labor are consumed in cleaning up the frequent roof falls. Faults and minor dislocations are of frequent occurrence, all of which makes the mining of anthracite more expensive than that of other coal. However, with improved mining methods and the introduction of coal-cutting machinery and mechanical conveyors, the thinner seams will be developed.

As is well known, in order to meet the requirements of the anthracite market, this coal when mined must be subjected to elaborate treatment. From the time the coal is loaded at the face and before being shipped, it must undergo a system of mechanical grading, sizing and cleaning by hand-picking and washing, which makes anthracite, in a sense, a manufactured product. By these processes, in South Wales, some thirteen different sizes are produced for various requirements. Swansea is the chief center for the production and marketing of this fuel. From 1894 to 1920 the production has increased from $1\frac{1}{2}$ million to $4\frac{1}{4}$ million tons, owing chiefly to foreign demand, which in 1920 consumed no less than 70 per cent of the output. There are few, if any, coal fields in the United Kingdom better equipped for shipment facilities than that of South Wales. The principal docks are those of Cardiff, Newport, Swansea, Port Talbot and Llanelly, all now under the control of the Great Western Railway Co.

Cement That Matures in 24 Hours

An extremely quick-setting cement is not desirable, but there are many instances where it would be advantageous to use a cement that after the initial set would in a few hours reach its maximum tensile strength. This is especially true in week-end work where operations have to cease unless the cement has hardened before the time for resumption. If the cement will mature in 24 hr. the delay in operation is nil or considably shortened.

A new product known as Lumnite cement is being manufactured at Northampton, Pa., by the Atlas Aluminate Cement Co., 25 Broadway, New York City. It is said not only to possess the desirable qualities of portland cement but to acquire a strength in 24 hr. somewhat greater than the other kind of cement will attain in 28 days.

A large proportion of high-grade aluminum ore (bauxite) is used in the mixture, and the raw materials are then fused and ground to a considerably greater fineness than is necessary under standard specifications for portland cement. When lumnite is used the mix should be slightly wetter than with portland grades because of the more rapid hydration of the former. The initial setting by this means can be arranged to be no more rapid than with portland cement

Lumnite cement is somewhat more expensive than portland, and it cannot be mixed with other cements without both losing their distinctive qualities.

Benwood Explosion Shows Need for Stricter and More Uniform Mining Laws

Fire That Followed Blast Quickly Extinguished by Sealing Off-All-Service Gas Masks Prove More Advantageous Than Oxygen Apparatus in Rescue Work-Necessity for Rock Dusting Emphasized

BY ROBERT M. LAMBIE Chief Inspector of Mines, West Virginia

THE necessity for a change in our state mining laws is forcefully brought to our attention by several recent serious explosions. The Castlegate explosion attracted most consideration because more men lost their lives in it than in others and chiefly



The Benwood Mine Was Believed Safe

Too much reliance cannot be placed on the condition of a mine as reported on a bulletin board by firebosses or any other official making an inspection. When the miners entered the Benwood pit mouth April 28 they felt assured of safety, for they saw on the bulletin board the date and the O.K. and initials of the two firebosses. Less than an hour later the explosion occurred.

because its occurrence awakened Utah to the need for drastic revision of and additions to its mining laws.

All attention is now focused on the situation created by the explosion at the Benwood mine, in West Virginia. The industry wants to know the facts—and rightly relating to the most serious explosion that has taken place in many years in that state.

The explosion in the Benwood mine of the Wheeling Steel Corporation, near Wheeling, W. Va., occurred on Monday, April 28, at 7:08 a.m., taking the lives of 118 men. Not a man in the mine when the explosion took place was able to save himself. Until the examining commission makes its investigation and the inquest is held, no statement can be made fixing the agent of ignition which set off the explosive mediums. However, it is safe to say that a pocket of gas was ignited and the resulting local explosion propagated by coal dust swept all the inner workings and galleries of the mine. The explosion is believed to have originated in Section 9, North.

At irregular intervals this mine, which works the Pittsburgh No. 8 seam, liberates gas at the faces of advancing headings. Nevertheless, it always was considered safe, though classed as gaseous, and open lights were used by all men with the exception of the firebosses, Dry and dusty sections of the mine were sprinkled by a water car. Both permissible and black powders were used for shooting.

The Benwood mine was opened up about sixty years ago. Its former owners developed it on a two-entry system for a distance of 7,500 ft. from the pit mouth. The present owners developed all its new workings on the three-entry system. Cross entries perpendicular to the mains and butt entries at right angles to the cross entries develop panels in which rooms are driven in two directions on both sides of the butts, which usually is the practice where no pillars are recovered, as in this mine.

EXPLOSION SHOWS VENTILATION INADEQUATE

Up until Feb. 24, 1924, only one intake and one return were provided for ventilation. Realization that better ventilation was needed, when a local explosion last autumn of a pocket of gas in which a fireboss and two other men were killed, led to the sinking of a 9x13-ft. concrete shaft 315 ft. deep. This has an open stairway but no hoisting equipment and it serves as an intake for a part of Section 5, North.

Two firebosses were constantly employed in the Benwood mine, starting their inspections in time to accompany the miners to their working places. On the morning of the explosion the firebosses had made their runs and reported no gas in any section of the mine. A night crew had distributed supplies, including explosives, to all working places in each of the live sections. As was customary, the distribution of supplies was supervised by one of the firebosses.

At 6:30 a.m. two man trips entered the mine. One traveled to Section 5, North, and the other to the main East and 8, North sections. Both trips had reached their destinations before the explosion occurred. The men in Section 5, North, were found a short distance from the trip and apparently were headed for their respective working places, as also were the majority of the men in Section 8, North. Eight men were found in 5 East haulageway in a small trip of mine cars that evidently had been detached from the main man trip and was being hauled by a gathering locomotive.

The men in the main East section had left the man trip and were found some distance away from the trip landing. One of these men was Fireboss Rawlins, who had examined this section of the mine for gas a few hours before the explosion.

The force of the explosion extended to nearly every section of the mine with the exception of an area within a radius of about 1,000 ft. of the airshaft, which is remote from the probable seat of the explosion. Its

Note.—This report was written before the investigation commission of state mine inspectors made its report and before the coroner's inquest was held.

violence was checked at a point on the main entry about 500 ft. from the pit mouth because of the presence of wet spawlings of roof material on the bottom of the entries. Because the explosion spent itself before reaching the outside, no damage was done to the ventilating fan. If the airshaft had not been sunk, or had the violence of the explosion continued unabated to and up the airshaft, it is quite likely that attempts to enter the mine would have been futile, and in that event the Benwood mine with its victims would have been sealed.

All stoppings on the main entry and many on secondary entries were demolished and several overcasts were partly or totally destroyed. That brick stoppings are stronger than those of tile was conclusively proved in this explosion, for the former resisted concussion while the latter collapsed.

The explosion started heavy falls of roof in almost every section of the mine, which hampered exploration work. Practically all timbers were dislodged, releasing heavy loads of roof material on the entries. So weak and treacherous is the roof in this mine that timber sets placed on 2-ft. centers were required on every principal entry. A 6-in. bed of roof coal is left in mining, above which is an easily weathered soapstone 4 to 10 ft. thick.

HEAVY FALLS ARE MENACE TO RESCUERS

Many difficulties were encountered which obstructed the rescue and exploration work to recover the bodies of the victims. Heavy falls on the main entry extended from the point where the explosion spent itself, 500 ft. from the pit mouth, inby for thousands of feet, obstructing an entry into the inner workings of the mine through the drift opening. A rescue team, on advancing 4,500 ft. from the pit mouth by crawling over the falls was forced to give up the attempt. In the evening of the first day activities were transferred from the pit-mouth side of the mine to the Browns Run airshaft.

In order to maintain a larger volume of fresh air in the workings being explored, the system of ventilation was changed. The intake of the split ventilating that area nearest to the pit-mouth side of the mine was stopped after two of the temporary stoppings erected in the early exploration were removed. This intake then aided the regular return airway in conducting air to the exhaust fan.

The change increased the flow of fresh air down the airshaft from 17,000 to 27,800 cu.ft. per minute and served, wherever the ventilation was effective, to draw all gases away from the shaft. The volume of fresh air entering the shaft was increased hourly as temporary stoppings were erected to guide the ventilation. Incidentally, the water gage reading of 7 in. is a measure of the damage done by the explosion in destroying ventilation and obstructing airways by bringing down roof.

Browns Run airshaft is reached by traveling over a country mud road for about 3 miles from a hard state road. A heavy rain throughout the first day made the mud road impassable for trucks; therefore wagons, sleds and tractors were used in transporting supplies to the shaft. As no hoisting equipment had been installed in the shaft, supplies had to be lowered by a rope attached to an improvised cage platform, passing over a pulley block fastened to a hastily erected wooden headframe, and drawn by horses. Later a tractor was pressed into service for raising and lowering the cage. Rescue men were compelled to use the stairs in entering and leaving the mine.

As an aftermath of the explosion, a fire broke out on a pillar between rooms No. 3 and 5 off 19 East heading. The roof in the vicinity of the fire fell heavily due to the high temperatures developed. The fire was discovered following an investigation subsequent to the night shift's complaints of headaches and the discovery of such manifestations of underground fires as "breathing" action.

Little time was required to extinguish the fire by sealing off the fire zone. An air lock was erected to allow the passage of men into the fire zone after the fire was believed to have been extinguished. After a search in this zone for bodies, it was sealed for the second time. The situation was precarious because of gas about 1,000 ft. from the fire, a fireboss patrol being required at all times to protect the men exploring the mine.



Scene at the Shaft on the Day of the Explosion The shaft has an open stairway but no hoisting equipment and serves as an intake for a part of Section 5, North.

The cause of the fire is not known, though the theory is advanced that a heavy squeeze on a room pillar caused spontaneous combustion. If the fire started before the explosion it may have been responsible for the latter. There are no manifestations of violence in the fire zone; consequently the explosion did not originate in this area.

The Benwood explosion, like several others of less serious consequences, should emphasize the necessity for classifying all mines as gaseous that liberate any quantity of gas. To avoid similar disasters, those mines which rightly should be termed gaseous must use approved electric cap lamps and explosion-proof motors and also permissible explosives.

The advantage in practicability of the Burrell allservice gas mask over self-contained oxygen-breathing apparatus in rescue and exploration work following an explosion was conclusively proved at the Benwood mine. At least fifty masks were in use at all times and about 90 per cent of the work was done by men wearing them. However, the self-contained oxygen-breathing apparatus was used to explore places where it was thought the percentage of oxygen in the air was not sufficient to support life. The latter equipment also was worn by men who accompanied the gas-mask crews, to act in cases of emergency. In only rare instances was the heavy and cumbersome outfit really required. Men wearing the gas mask penetrated as far as 125 ft. beyond points at which the carbon monoxide content of the air killed canaries.

How much greater are the freedom of movement and efficiency in the work of the wearers of gas masks was demonstrated to H. Foster Bain, Director of the U. S. Bureau of Mines, who spent a long time in this mine, wearing a gas mask himself and watching the rapid erection of stoppings, the recovery of bodies and other work by men equipped with the mask. In many cases, with cars jammed across the tracks and with timbers knocked crosswise and interlocked, it would have been exceedingly difficult to work with self-contained oxygenbreathing apparatus.

Mine rescue stations, in my judgment, are not complete unless equipped with at least ten gas masks.

Of the men who lost their lives in the Benwood explosion I am certain that the two men who were first found would have saved themselves had they carried a selfrescuer (diminutive gas mask). Evidence surrounding the finding of at least 35 bodies proved that these men were not killed by the violence of the explosion. As it was, many of these men tied handkerchiefs around their noses and mouths in an attempt to ward off death by the breathing of afterdamp. Had they also been equipped with self-rescuers, and not been prevented from reaching the outside by falls, they, too, would have been saved.

WILL URGE WEST VIRGINIA TO ADOPT ROCK DUSTING

There remains one more point about which I desire to speak, and that is the necessity for rock dusting to prevent the propagation of explosions. It is my intention to use every resource at my command to urge the operators of West Virginia to take this important step in the direction of safety.

The criticisms which appear in this report are not directed in particular toward any company, field, district or state. Accidents of small or large magnitude cannot be attributed directly to carelessness or neglect on the part of a mine or company manager. Before state mine departments can effectively place responsibility for accidents and fatalities they must build a structure of mine laws that provides no loopholes for evasion. The present laws must be brought up to date in order to meet with the requirements of our fast-growing industry and guard lives and property under conditions brought about by advanced methods of engineering and operation. To that end coal-producing states should combine in an effort to make uniformity of mine laws a major consideration.

It is high time that an interstate code of safe-practice regulations be formulated, to which individual states so far as possible should adhere, in a sweeping movement to revise and extend the scope of mine laws. There are many ramifications to the achievement of the purpose for which we should strive, but in sum and substance our biggest task is the attainment of uniformity in the mine laws of states in each competitive region. When this is accomplished, all operations in each of the several competitive regions will be placed on a plane of equality in regard to the monetary cost of obeying the mine laws in their respective states.

There is yet another phase of our prospective program which must not be overlooked. That is the education of the consumer of coal in the importance of safety in mining. He must be made to realize that the cost item resulting from the employment of safety precautions must be absorbed in the price of a ton of coal; also that safety can be obtained only by the use of permissible equipment, which is more expensive than that which is not approved, and safety devices of various kinds. All these increase the cost of coal. If only the consumer paid for these items, as he should, and in periods of depression such as we are experiencing now, cost cutting were not applied to anything that guarantees safety!

Benwood Blast Due to Ignition Of Gas and Dust by Open Lamp

Inquest Proves That No Mine Working Pittsburgh No. 8 Seam Is Safe Without Closed Lamps and Rock Dusting

FOLLOWING the presentation of evidence lasting all day relative to practices before and conditions after the Benwood mine explosion, at the coroner's inquest held in Benwood, W. Va., on May 10, the jury returned the following verdict: "That one George W. Holliday, Jr., and others came to their death in an explosion on the 28th day of April, 1924, in a coal mine located in the City of Benwood and owned by the Wheeling Steel Corporation, said explosion being caused by the ignition of an accumulation of gases combined with coal dust, by an open miner's lamp."

Such were the facts brought out in the hearing as told by all witnesses who knew the conditions as they might have existed at the point of origin before the explosion and as they did exist after. Though a fire was discovered in the mine during the exploration work, the evidence proved that even if it had started before the explosion, it was not responsible for the ignition of the gas which caused the latter.

Practically all the testimony coming from state inspectors, company officials and other men who helped in restoration of ventilation and the recovery of bodies proves almost conclusively that the explosion originated in No. 4 room on 9 East off 9 North. In this room a fall of 8 ft. of roof occurred about 20 ft. from the face.

This fall probably occurred after the fireboss' examination on the morning of the explosion. When roof falls in the Pittsburgh No. 8 seam under heavy cover it is likely to liberate gas soon after. This is what



Muddy Roads Impassable to Trucks but Not Tractors This is an example of the difficulties experienced in getting supplies to the Browns Run airshaft.

certainly must have happened. The miner who was supposed to work in this room most likely approached the fall and then either climbed over or around it, setting off the gas. His body was hurled from the face of the room to the entry.

No. 4 room is driven in about 100 ft. from the entry and is connected with rooms No. 3 and 5 by means of breakthroughs, in accordance with the mine law requiring that the latter be turned every 80 ft. Carbonization on the inby side of timbers and distinctive coking of ribs enabled the investigators to trace the path of the explosion from the fall near the face of No. 4 room out to the entry, and also through the breakthroughs to right and left to No. 3 and 5 rooms respectively and thence to the butt entry and through every part of the mine.

Interrogation of all witnesses who were familiar with the ventilating fan dispelled the rumor that the latter was shut down on Sunday. It had not been shut down for nearly two months prior to the explosion, and then only for about 20 minutes on a Sunday while brushes were being adjusted in the motor. Another rumor to the effect that one J. T. Boyle, who really laid track, was permitted to act as fireboss was as readily disproved.

MINE, THOUGH GASEOUS, NOT THOUGHT DANGEROUS

George W. Gehres, superintendent of the Benwood mine, admitted that gas is given off from time to time at faces in advancing headings and also accumulates in cavities formed by the fall of roof, but, he said, that this mine, though gaseous, was never considered dangerous. Barometric readings were taken daily and firebosses were conscientious in their work. Mr. Gehres believes the explosion occurred somewhere on the right side of the 9 North heading between 9 and 14 East because this section of the mine is the "hottest." He said that the mine is naturally dry; coal dust had to be loaded out regularly and the entries sprinkled frequently.

Jerome Pyle, fireboss, who examined places in the 5 North section in the morning of and prior to the explosion, admitted that his duties were not confined to firebossing alone; that in addition to his regular duties he supervised the distribution of supplies by a crew of two men on the night shift. He never left his own territory, however, and the supply men with open lights entered places to distribute supplies only after he had examined for gas and general safety.

The first of the two supply men on the night shift, Sam Buzinski, in reply to a question by Chief Lambie as to the occurrence of coal dust, said: "Yes, lots of dust; pretty dry on main line." He also remarked to the effect that the air was sluggish on 5 East entry on Sunday night. He reported this fact to the fireboss.

Paul Rijak, the second supply man on the night shift, admitted the presence of some dust on the entries. He substantiated his companion's remark that the air was slow on 5 East entry, due to a fall on 6 East.

Fred Christini testified that his duties were that of a patrolman, having to make his rounds on the off shift, going into all places but those abandoned, for the purpose of watching for fires, bad roof and timbers.



Browns Run Airshaft at Benwood Mine of the Wheeling Steel Corporation This concrete airshaft, which is 315 ft. deep. was completed only recently. It was the only opening through which the rescuers could enter the workings after the recent explosion. A wooden stairway in this shaft, fortunately, was undamaged by the explosion, being in a downcast. It aided the rescue men in their work. Bodies were raised and supplies lowered on a box or cage attached to a hemp rope which passed over a pulley block and was drawn by a caterpillar tractor.

He also was instructed to keep section switches of the power lines open.

D. M. Ryan, an operator who directed the work of getting supplies into the mine and who many years ago went through an explosion, gave his opinion as to the origin and cause of the explosion. He said that an idiosyncrasy of the Pittsburgh No. 8 seam in the Panhandle region is the release of roof gas, which accumulates in a cavity formed by a fall of roof. This accumulation may occur soon or a long time after a fall.

Because the rails in the 9 East heading off 9 North are badly twisted and other indications of great violence are found on this entry, he feels reasonably sure that it was the origin of the explosion. In answer to a question by Mr. Lambie as to the possibility of a fall of roof between the time the fireboss inspected No. 4 room and the time a miner might have reached the face to start work, Mr. Ryan said that that probably is what occurred. The miner, seeing the fall and thinking it had been examined by the fireboss, probably started to skirt or go over the fall with an open light on his cap, igniting the gas which quickly accumulates.

Several other witnesses admitted that an accumulation of gas following a fall could form after a fireboss had made his examination and before the day shift came on duty. They admitted that roof gas liberated by falls was treacherous. Falls of roof in the Pittsburgh No. 8 seam under heavy cover generally release such gas. For that reason approved electric cap lamps are really needed though seldom used.

Andy Boyce, a motorman who missed work on the day of the explosion, said that 9 and 10 East headings, on which the explosion is said to have occurred, usually are wet at the face. W. D. Lee, state inspector, however, said that the mine is dusty soon after sprinkling. Victor E. Sullivan, another state inspector, said the Benwood mine is the driest mine he has ever entered.

James Gibson, mining engineer of the Wheeling Steel Corporation, answered a number of questions by Robert M. Lambie which brought out the fact that the Browns Run airshaft was not in full-capacity use at the time of the explosion. A rearrangement of the courses of the air would have required the building of many stoppings, etc. These were being rushed and probably would have been completed in three weeks from the day the explosion took place. Two men found near the air shaft were stone masons.



Mill Yard from Which Entrance Is Gained to Benwood Mine, the Scene of the Recent Mine Explosion

The drift mouth is located just within this fence, and the main entries pass under the street. Little damage was done to the surface buildings by the force of the explosion. The main entries were obstructed by heavy falls.

The fact was also brought out that the distance between the Main East headings and the head of 8 and 9 North headings off the former is about 1,800 ft. In that distance the rise is about 15 ft. in the direction of the faces of 8 and 9 North entries. That means that gas is more likely to accumulate in this section than in any other part of the mine. He voiced the opinion that coal dust played no small part in the explosion.

Superintendent Gehres, again called to the stand, said that six certificate bosses were employed in the Benwood mine. Drop-bottom cars of a type that do not close in a tight fit were used and resulted in much spillage of slack along the haulageways. Coal dust was shoveled out at regular intervals. As much as 50 cars of dust had been loaded out in one clean-up. Sprinkling was resorted to when and where necessary with no fixed method or schedule. Mr. Gehres believes that a local explosion which killed three men last autumn occurred in 10 East off 7 North, which point is about 400 ft. from the origin of the recent explosion.

R. W. McCausland, general superintendent of mines

of the Wheeling Steel Corporation, is satisfied that the explosion started in the room designated by previous witnesses. He said that he received weekly reports in which the fact was noted that coal dust was being loaded out of the mine. He said that prior to the explosion he had no knowledge of the methods and frequency of sprinkling. When Mr. Lambie asked Mr. McCausland what had ignited the gas causing the explosion, he answered: "Open lights."

A. E. Lafferty, of the state, who inspected the mine two months ago, stated that as far as he was able to ascertain the mine was in good condition then.

All the recommendations which his department made, though costly, were being followed by the company. "A safe condition can be changed in a week; in an hour," said he. He also called attention to the fact that between 5 and 7 o'clock on the morning of the explosion barometer readings showed a fall of about $\frac{1}{2}$ in. Such a decided fall usually causes a greater liberation of gas than otherwise would escape from faces, roof or clay veins in the Pittsburgh No. 8 seam.

The inquest proves that no mine working the Pittsburgh No. 8 seam (and for that matter any other seam) is safe, comparatively speaking, unless closed lamps and rock dust are used. Any mine working the Pittsburgh No. 8 seam that is under heavy cover, if open lamps are used in it, may be the scene of an explosion today, tomorrow or any time. It is safer to play with dynamite than to work such mines with open lights. Chief Lambie recommended approved closed lights and rock dusting in this mine, and hopes that the time is near when these two precautions will be taken in every mine in West Virginia.

Low-Temperature Carbonization of Coal

OF ALL ways of using coal the most wasteful of all is to burn it. We are learning that slowly. Just when we were making up our minds that coking with saving of byproducts was a better way and had learned how to do it satisfactorily, word came that it should not be coked, it should be only charred, giving more light oil, a better domestic fuel and with certain briquetting and high temperature carbonization even a better metallurgical fuel than straight coke. Unfortunately, though we have learned how much better it is to char coal and what we would get from it by charring instead of coking, it would be an untrue assumption to declare that we have learned how to do it economically.

An English book entitled "Low Temperature Carbonisation of Bituminous Coal," written by Andrew McCulloch and Neville Simpkin and published by H. F. and G. Witherby, of 326 High Holborn, London, W. C. 1, explains quite adequately what has been done hitherto. Despite the fact that it says nothing of the Piron system, which Henry Ford has made prominent, it is extremely complete and truly international.

It must be remembered that England has made notable progress early and late, in low-temperature carbonization, notably in the Coalite, Maclaurin, L. M. N. (Laing, Marshall and Nielson), Pure Coal Briquette, Del Monte, Chiswick, Fuel Research, Freeman, Turner and Illingworth processes. All these are described in this volume with some that have been devised in Continental Europe.

The work of American chemists is scantily recognized, little reference being made to the division into resinic and humic sulphur which has engaged the investigatory powers of Powell and Parr. It is true their inquiries into the character of organic sulphurs is purely scientific. As yet they have led us nowhere but it cannot be safely overlooked for at any time they may open a way to a more perfect technique of coal treatment.

Some general remarks follow on the general problems of low-temperature carbonization and a lengthy reference is made to the many processes available. The final two chapters are on coal tar and low-temperature tar. An appendix details the specifications for British fuel oil, benzol motor-fuel oil, tar and pitch for roads and for grouting and the requirements of the German Tar Distillers' Federation for Diesel-engine oil. Another gives much information on coke structure and combustibility with many interesting illustrations of the former. A good bibliography concludes the book. May 15, 1924

COAL AGE



News Of the Industry

Farrington Urges Co-operation of Miners With Operators to Cut Output Cost

Sees Only Hope for Illinois Mines in Checking Inroad of Non-Union Competition-Thinks Nationalization of Mines Unlikely - Outlines Advantages of Giant Power Plan

Peoria, Ill., May 13.-Establishment of giant power plants in Illinois was suggested as a possible way of improving and stabilizing the coal industry, by Frank Farrington, president of the Illinois United Mines Workers, in opening the biennial convention of Illinois miners here today. He also be-spoke co-operation with the operators to cheapen the cost of producing Illinois coal, in order to check the inroads of non-union competition and provide work for union miners.

Unemployment, which has already overtaken 30,000 Illinois miners, was shown by Mr. Farrington to dwarf all other problems almost to insignificance. He dismissed the threatened attack on his appointive powers by an appeal to the reasonableness of the members, declaring it was not a political asset but an obstacle to any scheme he might have to form a "machine."

Outstanding features of his report were his suggestions for solution of the problem of unemployment, though he also devoted some attention to the matter of out-of-work benefits. He urged that the convention declare in un-equivocal language either for or against such payments and draft rules in accordance with its decision.

Cheap Production Paramount

"The bituminous-coal industry is highly competitive," said Farrington, "and under free competition, all other things being equal, that producer will secure the market who can produce the cheapest. From this it follows that any increase in the cost of production of coal in our district will result in in-creased competition from the unorganized field.

"As a matter of fact this competition has already reached a proportion which has become a serious menace to the life of our organization and the coal industry of Illinois as well. The widespread unemployment we have experienced of late in the Illinois field is due largely to the competition of Kentucky and West Virginia coal, which is underselling Illinois coal in the Chicago market. It also may be mentioned that had it not been for the shopmen's strike which seriously crippled the coalcarrying roads during our late suspension, the influx of non-union coal might easily have been fatal to our organization.

"The remedy for the competition of non-union coal would be, of course, the unionization of the unorganized fields. But while we all hope that some day these fields may be as strongly organized as our own district, we cannot blink at the unpleasant fact that all attempts in that direction have met with such tremendous obstacles as to make them more or less futile.

"In the face of such conditions it will become increasingly difficult to obtain the improvements in wages and working conditions to which our members are justly entitled. In other words, we find ourselves in the position where every increase in wages and lowering of hours of labor is followed by a reduction of production in the organized fields for the benefit of the unorganized fields. And if we follow this tendency to its logical sequence we may imagine situation when our wages and conditions are so favorable as to put an end to the coal industry of Illinois.

"In view of the unsatisfactory status of the coal industry, three successive conventions of the U. M. W. A. have adopted resolutions contemplating the nationalization of coal mines. Withnationalization of coal mines. out going into the merits or demerits of the plan suggested by our committee, let me state that the decentralized character of our government would make it exceedingly difficult to bring about the nationalization of mines, even if such a policy were found feasible and desirable.

"Fortunately we are so situated that the coal industry of Illinois may be organized on a new basis without waiting for the consent of two-thirds of the states of the Union.

"Such a reorganization would imply the creation of:

"(1) A semi-public corporation in which District No. 12, the operators, the consumers and the state would be represented, so as to safeguard the in-terests of all these factions.

"(2) The establishment of one or more giant power plants on the Ohio and Mississippi rivers for the manufacture of electricity.

"(3) An integrated network of major and minor power lines to make electricity available to every hamlet and farmhouse in the state.

"(4) The distillation of coal at or



Coal Miners May Pick Strauberries

The closing of the Consolidation Coal Co. mines at Seaboard, Va., throwing about 130 men out of work, has added considerably to the task of the Public Employment Service, recently inaugurated by the General Assembly to take care of such situations.

J. Hopkins Hall, State Labor Commissioner, calls attention to the fact that labor will soon be needed to harvest the strawberry crop and it has been suggested that idle miners be sent to the strawberry fields. Mr. Hall says that this would be "a happy solution" of the difficulty.

near the giant power stations, in order to save the byproducts of coal, which are now wasted. "The benefits anticipated from the

plan suggested are: (1) An increased demand for Illinois coal through (a) the substitution of electric light for kerosene light; (b) the substitution of electric power for gasoline power; (c) the substitution of electric stoves for wood, oil, gasoline and crude-oil burnof electrical labor-saving devices in home and farm, such as washing ma-chines, vacuum cleaners, corn shredders, etc.; (e) the illumination of concrete highways; (f) the substitution of artificial anthracite for fuel oil in heating plants.

Looks for Many Benefits

"Other benefits anticipated are:

"(2) A marked reduction in the price of light, heat and power at the expense of water in transportation, selling and

delivery. "(3) The stimulation of industry by a steady supply of light, heat and power at reasonable prices. "(4) The abolition of the smoke

nuisance.

"(5) Cheaper fertilizer for the reclamation of land.

"(6) Steady employment for our members.

"The plan as sketched herein must be merely regarded as a suggestion.

'Sooner or later the welfare of our country, as well as that of the coal industry, upon which the well-being of our members is dependent, will require a profound change in the mining, distribution and utilization of coal.

"And as there is no other body of our citizenship more vitally interested in the coal industry than we who bear its burden, I request that this conven-

Bituminous Coal Loaded Into Vessels at Lake Erie Ports During Season to End of April

		(IN N	ET TON	S)						
Toledo Sandusky Huron Lorain Cleveland Fairport Ashtabula Conneaut Erie Total.	Hocking Valley N. Y. COhio Central Lines Baltimore & Ohio Pennsylvania Wheeling & Lake Erie Baltimore & Ohio Pennsylvania Erie Baltimore & Ohio New York Central Pennsylvania Bessemer & Lake Erie Pennsylvania	Cargo 449,041 4,505 71,371 35,123 81,668 42,739 19,887 14,315 7,921 30,397 26,666 101,272 4,343 889,248 182,060		Total 461,431 4732 73,651 36,032 84,856 50,715 26,158 14,870 11,516 34,460 31,296 109,747 9,997 949,461 187,000	Cargo 112,013 57,039 83,308 84,586 126,999 96,309 74,251 22,392 208,511 29,444 137,381 18,292 1,105,074	923- Fuel 3,622 1,609 2,334 2,271 2,190 10,901 3,824 4,602 858 87,192 902 3,730 3,440 47,475	Total 115,635 58,648 85,642 86,860 56,736 137,900 100,133 78,853 23,250 215,703 30,346 i41,111 21,732 1,152,549	Cargo 202,729 251,346 176,364 7,612 17,820 43,358 31,083 28,342 22,152 21,835 802,641	1922 Fuel 5,824 4,567 4,883 334 2,835 5,624 2,792 1,688 3,365 31,912	Total 208,553 255,913 181,247 7,946 20,655 48,982 33,875 30,030 22,152 25,200 834,553
*Coal loaded into vessels i	n December, 1923, after close of navigation	and forwa	rded from	n Lake Er	rie ports du	ring 1924	season of n	avigation.		

Compiled by Ore & Coal Exchange, Cleveland, Ohio; H. M. Griggs, manager.

tion empower the executive board of District No. 12, United Mine Workers, to employ the funds of the organization for the purpose of obtaining the necessary advice to ascertain the practicability and desirability of the plan suggested herein.

Nearly 100,000 Miners in Illinois

"According to the records of the Department of Mines and Minerals we have a total of 374 shipping mines in Illinois. During the fiscal year ended June 30, 1923, an average of 99,081 men were employed. The mines worked an average of 146 days, or less than half time, and produced a total of 73,410,837 tons. This means that Illinois mines have a potential producing capacity of 150,000,000 tons annually. During approximately this same period, West Virginia, with about the same number of men employed, mined 103,-000,000 tons, or nearly 30,000,000 tons more than was mined in Illinois.

"The great bulk of the West Virginia tonnage was mined under non-union conditions at 1917 wage rates and much of it at rates lower than the 1917 rates. In fact in Mingo, Logan and McDowell counties, in southern West Virginia, where the bulk of the nonunion tonnage was produced, the miners are paid 90c. for loading a fourton mine car and the highest inside day wage rate is \$4 per day.

"In Alabama, Kentucky and Tennessee the situation is relatively the same as in West Virginia, excepting that in some parts of Kentucky the wages are higher than in West Virginia, but nowhere in Kentucky are wages as high as in Illinois, while in Alabama the wage rates are lower even than in West Virginia.

"Considering that Illinois coal must find a market in competition with coal mined in the states named the situation furnishes a problem for some very sober consideration on the part of the Illinois m ne workers. Last winter we had less work than during any winter period within my recollection and this summer promises less work than ever before and hunger and want is now present in the homes of thousands of our members.

A careful tabulation of the situation reveals that on the first day of this month 150 Illinois mines were completely closed, and many of them had been closed for months, with no immediate prospect of resuming operations and every indication is that as time advances more mines will suspend work. When these 150 mines were in operation they gave more or less employment to 30,000 of our members, and fully that number of men are now idle. Very few of the mines that are now operating are working more than half time and the great majority of them are not working that much. "I hold no brief for the Illinois op-

"I hold no brief for the Illinois operators, but I do for the Illinois miners and my only desire is to help the miners, but in order to do that I must help the operators find a wider market for their coal. Without markets there can be no work. The consumer will get his coal where he can buy it the cheapest.

"The mining industry is fully 50 per cent overdeveloped, which means there is an abundant supply from which the consumer may choose, and the competition for markets is, therefore, desperately keen and consequently the operator who can sell his coal the cheapest will get the business that means work for the miners. Therefore, there is only one way whereby we can get more work for Illinois and that is to cheapen the cost of producing coal in competition with coal mines in nonunion and sparsely organized districts where the cost of production is much less than in Illinois.

"I do not mean that I would have the Illinois miners accept a reduction in wages or give up any beneficial working condition. That would not help, for the reason that if wages were reduced the operators in competing fields would do likewise and the effect would be that all would be in relatively the same position only on a lower level, but there are means by which the cost of production may be reduced and without injury to the miners, but with profit to them in the way of more work.

"Respect your contracts, eliminate "Respect your contracts, eliminate strikes in violation of contract, work when the operator has work to do, do careful workmanship, load clean coal, reduce the amount of slack by careful shooting, give an honest day's work, co-operate with the management in doing the things that are right, fight for what is coming to you, but do not antagonize, and be on the square. All these things will tend to reduce the cost of production and bring more work to Illinois and relieve some of the distress that is among us."

Reliance-Hatfield Coal Cos. Are Merged

The Reliance Coal & Coke Co. and the Hatfield Coal Co., including the E. J. Hickey Transportation Co., Plymouth Coal & Mining Co., Inc.; the West Virginia Washed Coal Co. and the Licking Valley Coal Digger Co., have been merged into one unit after having operated separately, some of them over a quarter of a century, and in conjunction with each other as part of the Fleischmann interests in Cincinnati, Kentucky and West Virginia, along the Kanawha and Ohio rivers.

The combined unit, which will be known as the Hatfield-Reliance Co., will own in fee simple 6,444 acres of coal deposits and will have under favorable long-time lease 5,513 acres additional, estimated to contain more than 65,000,-000 tons of recoverable coal in West Virginia and eastern Kentucky. The company will operate four mines most modernly equipped, together with controlled mines and mining interests in the two states, and also holds control of stocks in many retail coal companies in Louisville, Carrolton and Maysville, Ky., and New Albany, Madison and Vevay, Ind., and in other river com-munities along the Ohio. The prop-erties are appraised at \$3,151,952.94, but are carried on the books of the new company at \$2,532,368.66, around \$0 per cont of companies Unlive 80 per cent of appraisal. Julius Fleischmann will be president, J. T. Hatfield be vice-president, Irvin Davis secretary-treasurer, August Helm as-sistant secretary and F. J. Ed Bramlage assistant treasurer of the company.

Name Hard-Coal Advisers to Commerce Department

The anthracite operators have designated the following representatives of the anthracite industry to serve as members of the advisory committee to the Coal Division of the Department of Commerce: S. B. Thorne, president, Thorne-Neale & Co., 17 Battery Place, New York City; G. N. Wilson, president, Lehigh Valley Coal Sales Co., 90 West Street, New York; Howard W. Perrin, vice-president, Susquehanna Collieries Co., Commercial Trust Building, Philadelphia.

Retrenchment Policy Seen as Menace To Co-operative Effort by Coal Industry

Statistical Data More Necessary Than Ever During Period of Stress -Funds Needed for National Association's Bureau of Economics Program-Unusual Responsibilities Confront New Administration

BY PAUL WOOTON Washington Correspondent of Coal Age

One of the unfortunate effects of the active and determined policy looking to retrenchment which is going on among the coal producers is the weakening of the industry's organizations. Local associations are weakening, and the National Coal Association is suffering seriously.

the discouraging circum-Despite stances which surround the coal trade at the time the National association is holding its annual meeting, it is believed that one of the effects of this gathering will be toward the prevention of allowing retrenchment to go to the point where it will undermine the industry's statistical foundation and deprive it of its one means of doing the constructive things which can be accomplished only through co-operation.

Disintegration among the local associations might proceed so far as to break down the structures necessary to collective bargaining. This did happen in 1893, when the coal business was in a situation quite similar to that which apparently is impending at this time.

Association Work Needed Now

It is important to the industry and to the public that co-operation, as represented by the activities of the local resented by the activities of the local associations and by the national asso-ciation, should go forward. The way out of many of the present difficulties lies in joint effort. The association is the only device on the operators' side through which joint effort can be carried out. Instead of shutting down statistical work and curtailing other activities, the associations, during a time of stress, should be working harder than ever. They should be given the means to capitalize the prevailing feeling of dissatisfaction with present conditions to get something better. If coal producers are to act intelligently in their own welfare and in the public welfare they must function as a unit in meeting a variety of situations.

The National association should be given the funds necessary to put through the broad program of its Bureau of Coal Economics. In addi-tion to the information which that bureau would collect and interpret, the National should be in a position to stage a comprehensive drive for membership. It should be more represen-tative of the industry. As it is, it frequently is looked upon as a non-union association. If for any reason local associations cannot be induced to affiliate with it, every effort should be made to obtain the maximum possible number of individual members in that district.

The administration which will pilot the National association through the next year is faced by unusual responsibilities, but its prospect of success is unusually bright if it will adopt an

the lining up of the industry for the common good. It is either that or simply the drawing out of the process of falling to pieces.

There are many who hope that the new administration will address itself to the task of putting in more concrete form the objectives of the industry. What should be done to meet its difficulties? How can better public rela-tions be established? What is the policy of the industry in the matter of co-operative marketing? Do coal producers want the Sherman anti-trust law amended and in what particulars? How can contracts be improved?

These and a hundred other suggestions could be made to make up a definite program of the objectives for which coal producers are striving. In addition, it is hoped that something can be done to raise the morale among coal producers. They have the enthusiasm and the spirit necessary; all that is required is to direct it in association channels. They should be impressed with the need of showing the same loyalty to their organizations that the mine workers show to theirs. The coal digger is willing to stick to his union even if it means going hungry and undergoing all manner of sacrifices. More of that spirit is needed among the operators. The foregoing are some of the thoughts which are being expressed as the operators are assembling for their principal gathering of the year.

Official Washington has its eye on Cincinnati. This convention is looked upon as something of a turning point in the affairs of the producers of coal. It is regarded as certain to indicate whether they are going to present a solid front in this crisis or whether they will disband and try to meet their difficutties in a disorganized way.

Russian Coal Output Higher

Gross coal output during the first quarter of 1923-24 (October to December) by the Russian coal basins of Donetz, Moscow, Ural, Kuzbas and Cheremkhov was 211,214,000 poods (a pood is equal to 36.113 lb.), compared with 144,349,000 poods during the corresponding period of the previous year, a gain of 46.4 per cent. The net output was 174,673,000 poods, compared with 103,349,000 poods for a similar period in the preceding year, an increase of 69 per cent. The greater in-crease in net output is due to a reduc-

tion in allotments to the miners. Production was higher in all fields, but the increase was especially marked in the Donetz Basin, where the gross output for the quarter was 62.9 per cent greater than for the corresponding period of the previous year.

Exports from the five Lasins during the above period were 133,842,000 poods, compared with 108,517,000 poods for the first quarter in the preceding year, a gain of 23.3 per cent.

On Oct. 1 last there were 602 coalmine enterprises employing 168,293 workers under the management of the Supreme Council of National Economy. Of these, 35 enterprises employing 37,842 workers were united in trusts and syndicates.

Production in the Maritime Province (Eastern Siberia) at the end of the business year 1922-23 was 90 per cent higher than the prewar output. The principal mines, those of Suchan and Zybun, which are operated by the government, produced 22,000,000 poods of coal, while the privately operated mines produced 16,000,000 poods. The sell-ing price of brown coal is identical with that prevailing before the war.

Coal Mine at British Empire Exhibition

Top works as seen from the entrance to the mine, at Wembley, Wales. A compre-hensive collection of cutting machines and other mining equipment also forms a part of the display.



Coal Men Hear Talk of Taxes, Trade Groups And Government Control at Cleveland

Paul Armitage, Goldthwaite H. Dorr and James R. Garfield Try to Rouse Them to Dangers of Overtaxation, Weakness of Trade

Associations and Waste of Resources

An attempt was made at Cleveland, Ohio, by the United States Chamber of Commerce, in annual session May 6-8, to make coal-mining men realize that they are in the same boat with other operators of natural resources and that there ought to be a pooling of effort in mutual defence. Paul Armitage talked about present overtaxation of mining, urging active campaigns against it; Goldthwaite H. Dorr, legal staff man last year for the Bituminous Coal Operators' Special Committee, argued for strong trade associations, and James R. Garfield one-time Secretary of the Interior, defended the government policy of control over natural resources.

A number of coal men were present at some of the Chamber sessions, registering a voice in the traffic group for a resolution urging Congress to postpone for a year Sec. 28 of the Transportation Act in the hope that coal exports abroad will not be interfered with by the act. If Sec. 28 goes into effect next month, as the act provides, it will require all coal destined for export to use American bottoms during all periods when the U. S. Shipping Board says there are plenty of American ships available. If such coal is consigned to foreign bottoms, it will move from mines to piers under the domestic freight rates, which are much higher than those on export coal.

National Coal Men Attend

Among the coal men present was this delegation to represent the National Coal Association: Louis Madeira, 3d, Madeira, Hill & Co., Philadelphia, Pa.; J. R. Crowe, president of the Crowe Coal Co. Kansas City, Mo.; Monro B. Lanier, Monro-Warrior Coal & Coke Co., Birmingham, Ala.; Michael Gallagher, Wheeling & Lake Erie Coal & Mining Co., Cleveland; S. H. Robbins, Progress Coal Co., Cleveland; H. R. Sullivan, Central Coal Mining Co., Cleveland, and Allan H. Willett, statistician for the National Coal Association, Washington, D. C.

tion, Washington, D. C. A wallop at the Ford proposal for the purchase of Muscle Shoals was dealt right lustily by Mr. Garfield. The former Secretary of the Interior took time from his main discourse to declare that turning Muscle Shoals over to Ford would be deliberately depriving the people of the great South of vast power service to which they are entitled under the government policy as to the disposal of natural resources. He said the potential development is about 800,000 hp., but that Mr. Ford agrees to devote only 100,000 to the manufacture of fertilizer for the farmers while he keeps the rest for himself.

"That's why I'm against Ford," said Mr. Garfield. "The plan as accepted by the House at Washington permits him to selfishly keep most of the resources of the development for himself. The government should control all such water powers and lease rights in them only upon such terms as will permit the people of the entire distribution area to be served. That is the principle behind government control of any natural resource."

He said that the people of this country had really waked up to the necessity for conservation only within the past quarter of a century. The anthracite men have always known pretty well what the anthracite resources of the land were because the deposit was so small and so definitely described; but nobody knew much about the extent and probable "lifetime" of bituminous coal. The awakening, however, has now produced a different feeling on the part of the people toward their coal, their oil, their timber and the other natural resources.

Early Efforts Misunderstood

The government's early efforts at conservation were much misunderstood. Owners of great stands of timber couldn't see at first why they should not do as they pleased with it, and power interests that had been farsighted enough to reach out and grab many good watersheds for future use felt the same way. But most such interests have come around to the government's position that all the people, not a favored few, should benefit by the resources, and future generations are as much entitled to the possible benefits as this generation.

That is the reason, he said, that men permitted to operate public coal lands now readily agree that they should use the deposit so as to safeguard the interests of all the people. When that isn't done voluntarily the government is obliged to step in and see that it is done compulsorily.

The mining industries of the country should begin organized efforts at once to educate the people, the legislatures and the courts of the land, said Mr. Armitage, well-known tax expert, so as to offset the tendency to overtaxation. He said such a tendency these days is strong enough to be a real menace, as evidenced by the Minnesota iron and Arizona copper cases, now well known, where mining is taxed and supertaxed and overlaid with layer after layer of special taxes so that it groans under the burden.

The mines, the oil and gas deposits and the timber of the land are basic resources. It is unthinkable what would happen to industry if the output of these industries were cut off. Every man, woman and child would be affected at once. Yet, he said, legislatures gayly toss outrageously heavy tax burdens upon such industries with no thought of the way they are striking at the rest of their country's whole industrial structure.

For one thing, he said, law makers

and law interpreters should be taught that depletion and loss incident to production is an allowance that ought to be permitted for capital cost and should be deducted before taxation. A Supreme Court decision a few years ago denied the reasonableness of this, he said, but the decision was based on nothing short of plain ignorance. Today the tide is turning and he thinks if the point were to be raised again before the Supreme Court, the previous decision would be reversed. There remains a great deal of educational work to be done, however.

He contended that the opening of new mining deposits to replace workedout areas ought to be regarded as discoveries and should not be penalized by taxation. Up to 1918 they were treated as excess profits, but today a more reasonable attitude is taken. He pleaded for smaller taxes or no taxes at all upon mining reserves. A study showed that a 3-per cent tax on a certain metal reserve deposit, if continued for 30 years, would bleed the owners of the entire value of the deposit. However, most states try to tax reserve coal and ore.

Mr. Armitage complained bitterly about government extravagance and wastefulness, saying he doubted whether the present administration could possibly reduce taxes at the rate expenditures are running. He thinks his proposed tax-reducing organization in the mining industries could profitably devote a good deal of time trying to reduce government waste, extending itself even to the point of carrying out government enterprises so as to get the work done at reasonable cost.

Attacks Anthracite Tax

He cited a long list of special taxes, like the Pennsylvania 1½ per cent anthracite tax, which have been levied within the last few years, mentioning the effort Congressman Kellar of Minnesota is now making at Washington to get a straight 1 per cent tax laid upon the entire coal and metal deposits of the country so as to raise \$650,000,-000 a year for Congress to spend. The "natural heritage of the people"

The "natural heritage of the people" argument, upon which such taxes of coal and ore are defended, he attacked as fallacious reasoning. Men open the mining deposits of the country by great expenditure and risk of capital and the application of much labor and inventiveness. Without these expenditures the deposits would be worthless. Therefore the "natural heritage" argument for the taxation of these deposits is illogical.

It is easy to tax mines because they are always within reach and cannot get away. Also absentee ownership of many of them makes them especially tempting targets. This is so true, he said, that today the public is plundering these resources by taxation. This and the public ownership propaganda ought, he thinks, to wake up the whole mining industry to its danger so that it will defend itself more effectively.

At the close of the Chamber session by the division of natural resources production, a resolution was adopted protesting against the compulsory reporting to the government of any sort of statistics on ordinary business operations.

Hoover Says Trade Associationism Is Saving Coal Industry from Itself

Tells U. S. Chamber of Commerce That This Idea Is What Gave Steady Running Time in 1923 and the Three-Year Agreement -No Call Now for U.S. Control of Coal

The trade-association idea has already done a great deal for bituminous coal and can do a great deal more, Herbert Hoover, Secretary of Com-merce, told the U. S. Chamber of Commerce at its Cleveland convention May 7. It was that very idea, practiced jointly by coal and railway associations and the Department of Commerce, that caused wide buying of coal last summer, thus preventing the troublesome annual drop in production in the hot months. It was the same idea at work, he said, which produced the three-year contract at Jacksonville, thus giving the industry some promise of stability for that period.

He said the development of proper trade-association work convinces him there lies within such associations "a great moving impulse toward betterment." He implied that this is exactly the sort of thing that will answer the one-time loud demand for government control of business. He does not believe that "today there is any sentiment for government regulation of the bituminous-coal industry."

Commerce Department Co-operates

"I propose now to mention a case most vitally important, rendered possible only through associational activity in which the Department of Commerce has been in active co-operation," said Mr. Hoover. "That is in the bitu-minous-coal industry. There have been developed in this industry, as many of you are aware, 30 per cent too many mines operating intermittently during nearly every week of the year with a large seasonal dip in summer. Thus they required 30 per cent more labor and 30 per cent more capital than was necessary to produce the nation's coal.

"One effect of this situation was that some proportion of the employees obtained too few days' work to yield them a reasonable standard of living, even at the apparently high daily wage. This minority of employees were naturally a constant source of agitation and disturbance. The result of all this was a higher cost of producing coal and con-sequently a higher national coal bill; speculation and uncertainty to the operators; hardship, difficulty and in-stability to a considerable portion of the workers.

"The fundamental cause was a vicious cycle of seasonal fluctuation in demand, annual shortages in coal cars, and periodic strikes which grew out of the instability of labor relationships. These periods of shortened or suspended production always resulted in famine prices for coal and great stimulation to the opening of new mines.

"At least four government commissions have examined this question. Probably forty bills have been introduced into Congress proposing governmental regulation in an attempt to correct the abuses and wastes and public danger that lay in the situation.

"The associational agencies in the field were those of the operators, of labor, of the railway executives and of the various associations of industries as consumers. The first problem was to obtain a general knowledge of the causes, to which I feel the Department of Commerce contributed substantially. Remedy was undertaken in many directions. The railway association induced the construction of a more ample supply of coal cars and greater expedition and interchange in handling be-tween different railways. The Department of Commerce, in co-operation with the Chambers of Commerce, manufacturers' associations, railway and public utilities associations, effected the place-ment of more coal in storage during the summer season. The result was that last year for the first time in many years we had no interruption in the distribution of coal due to car shortages. One element of the vicious cycle in this situation is eliminated, provided we can continue this same co-operation in future.

"The second part of the solution was the general agreement by both operators and labor that stability could not be restored in the industry unless there was a long period of continuous operation in which the absence of coal famines and profiteering would eliminate the speculative and high-cost producer and reduce the units in the industry and thus its intermittency. The labor agreement between these associations made last February for a term of three years has assured this improvement. "Here we have an example of the

most profound national importance in at least the beginning of stabilization of an industry involved in a most vicious cycle of waste and trouble. The national savings can be measured in hundreds of millions and the human hardships greatly lessened. There will be some preliminary hardship in so great a self-imposed surgical operation, but I am confident it will heal to the mutual interest of the operators, the public, and the workers. Today I do not believe there is any sentiment for government regulation of the bituminous-coal industry.

"Three years of study and intimate contact with associations of economic groups, whether in production, distribution, labor or finance, convince me that there lies within them a great moving impulse toward betterment. If these organizations accept as their primary purpose the lifting of standards, if they will co-operate for voluntary enforcement of high standards, we shall have proceeded far along the road of elimination of government from business. American business is never secure unless it has public confidence behind it. Otherwise it will always be a prey to demagoguery and filled with

discouragement. "The test of our whole economic and social system is its capacity to cure its own abuses. New abuses and new relationships to the public interest will occur as long as we continue to progress. If we are to be wholly dependent upon government to cure these abuses we shall by this very method have created an enlarged and deadening abuse through the extension of bureaucracy and the clumsy and incapable handling of delicate economic forces.

"The government can best contribute toward the day-to-day progress of business life through stimulation of and co-operation with voluntary forces in our national life, for we thus preserve the foundations upon which we have progressed so far-the initiative of our people. With vision and devotion these voluntary forces can accomplish more for America than any spread of the hand of government."



Courtery U. S. Distributing Corp

Barge Convoy Ready to Help Fuel New York

This fleet of barges, belonging to the U.S. Distributing Corporation, awaits a train-load of coal at one of the New Jersey rail terminals at Edgewater, N. J., opposite New York City.

Buy Coal Now, Says Hoover Letter to Trade Bodies

Herbert Hoover, Secretary of Commerce, addressed a letter May 10 to secretaries of trade associations asking their support in urging manufacturers to begin buying and storing coal now in order to avert car shortage and transportation congestion next autumn. The letter in part is as follows:

"The fall car shortage always has the effect of increasing the price of coal and of seriously disturbing the whole economic machine. Security lies in repeating the storage performance of last year, by the manufacturers of the country taking reserves of coal during the months of May, June and July, thus foregoing the necessity of coal shipments during the peak period in competition with the household movement. Outside of strike years, these months are universally the period of lowest bituminous-coal prices. "We also have a national prob-

"We also have a national problem in the long view of securing cheaper coal by maintaining more regularity in production of our mines through planing out seasonal fluctuations.

"I therefore ask that your association actively interest itself in bringing these matters to the attention of the large coal consumers from the point of view of their personal interest as well as a contribution to the mutual good of American business."

Shipping Board Opens Bids At New York

Seventeen coal firms submitted bids to the U. S. Shipping Board at New York on Monday, May 12, for furnishing and delivering not more than 18,000 gross tons monthly of navy standard coal for use on vessels of the board operated from New York Harbor. The deliveries are to extend over a period of one year. The bids follow:

J. H. Weaver & Co., \$6.05 f.a.s.; Quemahoning Coal Oo., \$5.25 f.a.s.; Willard, Sutherland & Co., \$6.60 t.i.b., \$5.95 f.a.s.; Independent Coal Corporation, \$6.33 t.i.b., \$5.60 f.a.s.; Eastern Fuel Co., \$6.21 t.i.b. over top bunkers, \$6.41 t.i.b. through side bunkers, \$5.81 f.a.s.; Seiler Coal Co., \$6.66 t.i.b., \$5.61 f.a.s.; Horgan Fuel Corporation, \$5.23 f.a.s.; Steamship Fuel Corporation, \$6.31 t.i.b., \$5.51 f.a.s.; Imperial Coal Corporation, \$5.90 f.a.s.; Cogrove & Co., \$6.82 t.i.b. over all bunkers, \$7.02 t.i.b. through side bunkers, \$6.02 f.a.s.; Coleman & Co., \$5.51 f.a.s.; H. B. W. Haff, \$5.93 alongside, 10,000 tons monthly; W. A. Marshall & Co., \$6.65 t.i.b. over all bunkers, \$6.85 t.i.b. through side bunkers, \$5.99 f.a.s.; Commercial Coal Co., \$6.12 f.a.s.; Pennsylvania Coal & Coke Corporation, \$5.68 f.a.s.; Johnstown Coal & Coke Co., \$5.17 f.a.s.; E. Russell Norton, \$7.05 t.i.b., \$6.99 t.i.b. freight ships.

Timely Topics on Tapis at Wholesalers Convention

When the American Wholesale Coal Association holds its annual convention at White Sulphur Springs, W. Va., June 3 and 4, between 400 and 500 wholesalers from all parts of the country will be in attendance. The committee in charge of arrangements has so arranged the program that the business sessions will convene at 9:30 a.m. and adjourn at 1 p.m., leaving ample time for recreation.

The business sessions of the convention will be of great interest and importance to all those connected with the coal industry. Realizing that the conditions facing the coal trade today are different from any with which they have ever before had to contend, the discussions will be along lines calculated to solve some of these difficulties and to build a constructive platform for the future.

Among the speakers will be F. R. Wadleigh, of the Tuttle Corporation, New York, and former Federal Fuel Distributor, who will present for consideration a plan looking to close coordination between the various branches of the industry. E. M. Platt, president of the Platt & Brahm Coal Co., Chicago, will discuss "Costs and Credits." "Oil Competition" will be handled by Borden Covel, president of the Northern Coal Co., Boston, Mass. "Transportation and Its Relation to the Coal Trades" will be the subject of a paper by G. N. Snider, for many years coal traffic manager of the New York Central Lines and more recently general manager of Dickson & Eddy, New York. "The Wholesaler of the Future" will be the subject of an address by Owen Meredith Fox, associate editor of Black Diamond, Chicago.

Other features will be announced as the program is completed. These subjects alone insure wide interest and discussion of the problems before the convention. Everyone connected with the coal industry in any way and particularly wholesalers, irrespective of membership in the association, are urged to be present and to assist in solving the problems confronting the industry.

Lockout Cuts Ruhr Coal Output

A lockout May 6 of mine workers who rejected employers' proposals for a longer workday was quickly followed by a general strike in the Rhenish Westphalian mines, in the Ruhr Valley. The workers demand a seven-hour day, contending that their wages, which vary from 5.60 to 6.10 marks per day, are insufficient to maintain their strength for longer working hours. All the unions, both Conservative and Socialist, are in agreement in the demand, though only the Communists favor a strike. Coal reserves in the Ruhr are so limited that other industries will be affected soon and thousands of other workers thrown out of work.

The operators assert that they can meet the demands of the industrial agreement with the French only if production is cheap.

Champion Coal Loader Has Charley Horse

William Allen Bumpers, claimant of the coal-loading championship of West Virginia and Kentucky, is temporarily out of the running, due to a muscular ailment that makes it necessary for him to use crutches, but he expects to be back in the running again in a few weeks. During the last several months he said that he had been "going on high," turning out 60 tons of coal a day. His pay checks for January totaled \$499.42 and in February, the shorter month, he made \$399.56.

During the war his pay averaged \$26 a day for 18 months, when he turned out 40 tons a day. With the lowering of wages, following the war, he had to speed up a trifie, hence his more recent record of 60 tons a day. He is a nonunion miner.

"At Hazard they paid me around \$700 a month for a time," said Bumpers, "but I'm usually found in West Virginia, where I have worked, on and off, for 26 years. Business is slow now and we aren't loading so much coal, but we are a lot better off than some of the closed-shop fields, where the union has the bigger wage scale, but less work."

Bumpers is a negro, weighs 177 lb. and is 45 years old, but looks much younger, although he is the father of six children and has worked hard all his life.

Government Fuel Yard Seeks Coal Bids

The Government Fuel Yard, Washington, D. C., will receive proposals up to 10 a.m., Wednesday, May 28, for the coal requirements of the district and federal governments for the fiscal year July 1, 1924, to June 30, 1925. The estimated requirements are 14,990 tons. more or less, of anthracite and 239,600 tons, more or less, of bituminous coal. Specifications may be had by addressing the Chief Engineer, Government Fuel Yard, Room 1139, Interior Department, Washington, D. C.

Coal Consumption and Power Output by Utilities Drops

Electric public-utility plants of the United States consumed 3,250,947 net tons of coal during March, according to a report just issued by the U. S. Geological Survey. This compares with 3,330,107 tons consumed in February and 3,664,258 tons in January. Fuel oil consumed by utility plants in March totaled 1,538,178 barrels, compared with 1 544,927 barrels in February and 1,618,591 barrels in January.

The average daily production of electricity by public-utility power plants in March was 160,700,000 kw.-hr., about 3½ per cent less than the average for the month of February. This decline probably was due in part to seasonal effect.



Practical Pointers For Electrical And Mechanical Men



How to Select Grinding and Polishing Wheels and Use Them Without Risk

What Kinds of Wheels Should Be Used and for What Purposes--How to Mount Them so that They Will Not Break-How to Order Wheels of Suitable Size

> By GUSTAV RADEBAUGH University of Illinois, Urbana, Ill.

A MINE repair shop is not complete unless it has a good grinding stand and the necessary equipment to do all the grinding and polishing of the soft and tempered steel tools which must be used in general repair work. When a good serviceable grinding stand has been purchased for the mine shop and properly installed, the purchaser only too often is disappointed in the work it does. The reason for the workman's inability to obtain good work is directly traceable to material of which the grinding wheels are made.

To get good results from the machine only the best types and grades of wheels should be used. It must be appreciated that the grinding wheel is the business end of the machine. Oftentimes cheap wheels are supplied with the stand, and the operator has discouraging difficulties. The supplies used in the mine repair shop should be as good as those found in the best commercial shops.

To be able to meet all grinding demands, two types of grinding wheels should be supplied—one for tempered steel and the other for soft metals. The emery wheel so long used for grinding has been superseded by commercial abrasives known to the trade as carborundum, aloxite, alundum, and corundum. Manufacturers have published extremely useful information about



Fig. 1—Testing a New Wheel As soon as a new wheel is received at the shop it should be tested for flaws. This can be easily done by sounding it with a light steel hammer. these abrasives. If you know what they are and for what type of grinding they are best suited you will be better able to select the right wheels for the grinding stand. Carborundum is a manufactured abrasive. It is not found in nature. It is a chemical combination of carbon and silicon. Carborundum is the trade name of carbide of silicon, a substance discovered by Edward G. Acheson in 1891. It is much harder than any other known abrasive. This gives it great durability. It is made up of small, sharp crystals just brittle enough to break slightly in use.

The sharp edges of the crystals cut clean and fast, and the brittleness of the material causes it constantly to present to the work fresh cutting edges, thus preventing the glazing of the wheels. The characteristic property of brittleness makes it highly efficient for grinding and polishing such metals as cast iron, chilled iron, brass, and bronze, also marble, granite, pearl, and in general, all materials of low tensile strengh.

The abrasive material for grinding steel successfully must be not only hard and sharp but tough. These characteristics are found in aloxite, a new aluminous abrasive. Aloxite is the purest form of aluminum oxide. It is the product of the electric furnace, differing materially from other aluminous abrasives in several of its characteristics, the principal one of which is its temper, which makes it the ideal steelcutting material.

In its crude form aloxite is taken from the electric furnace in an immense compact pig weighing several tons. This pig, by means of special, powerful machinery, is crushed or reduced to grain form. The aloxite grain then undergoes a thorough refining until every possible atom of impure matter is removed.

There are three processes of manufacture. The vitrified process consists of bonding the grain with certain clays, and vitrifying or baking at a high temperature. This changes the clays to a substance similar to porcelain. The vitrified wheels are most generally used



Fig. 2—Fitting the Wheel on the Spindle

An improperly fitted wheel is always dangerous. Broken guards and accidents frequently result from tight or loose wheels. It is usually disastrous to force a wheel on a spindle that is too large for it.

because, by this process, a wider range of grades can be obtained, because the wheels can thus be made more open and porous, thereby assuring a cool cutting wheel and because they are durable and stand up to the work. However, owing to its rigidity, vitrified material is not used where a thin wheel subject to side strains is required.

In the silicate process silicate of soda is used as the bonding agent. Wheels made by this process cut less harshly than the vitrified wheels and are used extensively for knife grinding and for sharpening saws and woodworking tools in mine shops, furniture, sash, door and blind factories and planing mills. Silicate wheels can be supplied with a wire web if desired.

Thin wheels usually are made by the elastic process, which consists of bonding the grain with a more or less elastic material, such as shellac or rubber. These wheels are extremely tough, fast cutting, and can be run without danger of breaking at high speeds and under moderately heavy side strains.

Most jobbers dealing in grinding wheels know the type of work for which the different wheels are used and have co-operation from the manufacturer in obtaining the best wheel for the job. It is more satisfactory in most cases, therefore, to leave the selection of the wheel to the dealer. The conditions under which grinding wheels are used vary to such an extent that no absolute rule can be given for selecting the right grain and grade. There are no wheels so constructed that all materials can be ground equally well with a single wheel. In mine repair-shop practice, however, it is not necessary to have more than two kinds of wheels.

One of the large manufacturers of wheels recommends for all the types of



Fig. 3—Put Washers on Both Sides A compressible washer made of leather, cardboard or heavy paper distributes the pressure of the langes. Unless some such arrangement is used the wheel easily may be broken.

grinding jobs that will be done in the repair shop two wheels: One 14 in. in diameter, 2 in. thick, 14 in. arbor, grit 24, grade H vitrified bond, of carborundum material; the other an aloxite wheel of the same dimensions, made of the same size of grit and bound with the same bond. The aloxite wheel is used for grinding all kinds of steel and the carborundum for castings, etc.

When a new wheel is received it is good practice to test it. (See Fig. 1.) Wheels in transit sometimes are broken or cracked, yet so slightly that the defect is not noticeable to the eye. Α simple test is to strike the wheel a light tap with a hammer. If the stone rings it is safe for use. Before shipment all makers of good wheels test them at a speed approximately 50 per cent greater than that at which they are to be operated. On each wheel a tag will be found glued to the center. The kind of wheel (carborundum, aloxite, alun-dum or corundum), the grain and grade, size, number, outside diameter, bore, surface, speed at which the wheel should be run, and the speed at which the wheel was tested are among the data found on this tag. This record should be filed away for reference. Having this information, if a wheel is not satisfactory, inquiry regarding it can be made. This tag is equally valuable as a reference when ordering a duplicate.

Do not force the wheel on the spindle of the machine. The diameter of the hole in the wheel should be at least 0.005 in. larger than the diameter of the spindle. It is essential that the wheel should not be cramped on its arbor. If it goes on the spindle free (Fig. 2) you may be assured that it will fit properly against the inside of the flange. Too much cannot be said about the importance of the wheel being mounted properly.

Flanges at least one-half the diameter of the wheel should be used. Compressible washers of leather, rubber packing or blotting paper, slightly larger than the flanges should be placed between the wheel and the flange (Fig. 3). If no washers are supplied with the wheel it is an easy matter to make up several of the heavy paper taken from cardboard packing boxes. A washer protects the wheel because it takes up any imperfection in either wheel or flange and thus the pressure on the wheel is distributed evenly when the flanges are tightened.

Table	I-Dia	neter	and	Thi	ickne	ess	of		
Wh	eel for	Any (Giver	ı Di	ame	ter			
of Spindle									
Minimun Va	n Sizes of rious Dian	Machin meters a	ne Spir and The Whee	ndles hickne	in In esses (ches of	for		
Thicknes: Wheels	s of in Inches	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1	1	13	2	21/2		
Diamet Wheel,	er of In.	Diamet	er of	Spind	le in	Inch	ies		
4	1/2	- Ch-CB-	ster 3	3					
10			10.14	4 34	3	1	1		

When the wheel is placed on the spindle the nuts are too often turned too tight. The flanges should be tightened only enough to hold the wheel firmly, without unnecessary strain (Fig. 4). With the left hand the operator holds the bolt securely and with the right hand brings the nut up snugly against the washer. One jobber, to emphasizes the danger of unnecessary tightening of the spindle nuts, makes the following statement: "On a 1½-in. floor grinding machine equipped with 8-in. standard relieved flanges a man with a 2-ft. wrench can easily exert

14

To Get Maximum Life Use Lamp of Right Voltage

The economy of burning lamps at their proper rated voltage cannot be too strongly emphasized because of the reduced life and efficiency contingent upon even a slight difference between the voltage at the socket and the rated voltage of the lamp. Lamps used on over-voltage circuits are brighter, but give their excessive light at a sacrifice in life. When lamps are operated at under-voltage, the life is, of course, increased, but the efficiency is greatly decreased.

The life of the average Mazda lamp is one thousand hours, when operated at rated voltage. Fig. 1 shows how the life of the lamp decreases when it is operated at a voltage higher than that for which it was designed. For example, consider the effect of using a 110-volt lamp where the actual voltage at the socket is 115. This seems like a small difference, doesn't it? Yet the curve shown on Fig. 1, which has been determined from a large number of tests, shows that the actual life of the lamp will be only 140 hours, or 14 per cent of its rated life. In this case, an increase of 4.5 per cent over the rated









Fig. 4—Tighten the Nut Enough to Hold Wheel Safely

Excessive pressure should not be applied to the side of a grinder. Strains set up by clamping the flanges too tightly often result in breakage. An accident often happens from the cracking of a wheel before the defect has become apparent.

a crushing pressure of 3 600 lb. It is obvious that the wheel will be damaged if any such pressure is placed on it." The spindle of the grinding stand regulates the size of the wheels that can be used safely. Table I gives the diameter and the width of the wheels than can be used on a spindle of any given size. When ordering wheels this table should be used.



Fig. 2—Candle-Power Greatly Reduced on Low-Voltage Circuits

By operating a lamp on a circuit having a voltage lower than the rating of the lamp the life is increased but the efficiency and candle-power are reduced.

voltage causes a decrease of 86 per cent in lamp life. If a lamp rated at 110 volts is placed on a 220-volt circuit, it will burn out instantly.

Fig. 2 shows the effect of operating lamps at a voltage lower than the rated value. If, for instance, a 110-volt lamp is used on a 100 volt-circuit, the light output would be only 74 per cent of its rated value. In this case, the candlepower is decreased 26 per cent by a 10-per cent under-voltage.

The obvious remedy, of course, is to use lamps having a voltage rating equal to the average voltage at the sockets. The voltages of lighting circuits have been standardized into two ranges, namely, 110, 115 and 120 volts, and 220, 230, 240 and 250 volts, the first range, particularly the 115 volts, being that generally used. Special lamps of voltage ratings other than those listed above are obtainable, but they should not be used because it is difficult to obtain them and because they are more expensive.

FRANK PAESKE.



Bituminous-Coal Markets Show Little Change; Sentiment More Cheerful

The long looked-for and much hoped-for improvement in the bituminous coal market has not yet materialized. The general situation is as unsatisfactory as at any time during the last few months; demand is weak and fitful, production holds at rock bottom, a large number of mines are still idle and the running time at those working is sadly curtailed. As a consequence prices have a hard time holding their own at even the discouraging levels of recent weeks. None the less there are indications of an improvement in sentiment, based to some extent upon the gradual disappearance of distress coal. The signing of contracts is far from brisk, but movement to the lakes is picking up, shipments by the Hocking Valley R.R. to Toledo being three times as large as at this time a year ago.

Hoover Urges Early Buying

In order to spread out the movement of coal and thus ward off possible car shortage and traffic congestion next autumn Herbert Hoover, Secretary of Commerce, has addressed a letter to secretaries of national and state trade associations urging manufacturers to purchase and store coal during May, June and July, when bituminous-coal prices are low and the railroads in better condition to handle the traffic.

That one-time radical, Frank Farrington, miners' union president in Illinois, recognizing the economic crisis that confronts the union in that state proposes a giant power plan to increase coal consumption, pointing out at the same time the necessity of co-operation by the miners with the operators to cut down production costs in order to lessen the inroads of competition by non-union fields.

Coal Age Index of spot prices of bituminous coal on May 12 was unchanged from the preceding week, standing at 169, the corresponding price being \$2.05. Dumpings at Hampton Roads for all accounts during the week ended May 8 totaled 293,849 net tons, as compared with dumpings of 326,962 net tons during the preceding week. Cargo coal dumped at Lake Erie ports during the week ended May 10, according to the Ore & Coal Exchange, amounted to 450,570 net tons, and of fuel coal 32,726 tons. This compares with



500,740 tons of cargo coal and 20,708 tons of fuel coal dumped during the previous week.

Production of bituminous coal revived to the extent of 108,000 during the week ended May 3, when, according to the Geological Survey, the output was 6,832,-000 net tons. This compares with 6,726,000 tons produced during the preceding week. Anthracite output also took an upward turn, 1,616,000 net tons having been produced, compared with 1,205,000 tons during the week ended April 26.

Curtailed production of anthracite due to local labor disturbances has stiffened the hard-coal market. Independent domestic sizes are now quoted at close to company circular and in some instances shippers have had to refuse orders for immediate delivery. The strong demand for pea coal has led many to believe



Estimates of Production									
(In Ne	(In Net Tons)								
BITUM	INOUS								
April 19 April 26 (a) Daily average Cal. yr. to date (c)	May 3 10,221,000 10,103,000 10,061,000 1,677,000 187,097,000	May 10+ 6,918,000 6,724,000 6,832,000 1,139,000 169,161,000							
Dally av. to date.	1,771,000	1,603,000							
ANTH	RACITE	1 (22 000							
April 19 April 26 May 3 Cal. year to date	2,065,000 2,116,000 2,021,000 35,615,000	1,623,000 1,205,000 1,616,000 31,249,000							
CC	KE								
April 26 (a) May 3 (b) Cal. yr. to date (c). (a) Revised from last revision. (c) Minus one of ize number of days in the	424,000 407,000 6,773,000 report. (b day's product two years.	224,000 205,000 4,888,000) Subject to ion to equal-							

that the country was short of domestic sizes, but the movement is explained largely by the fact that a number of consumers take some of this size in order to get more of the larger sizes. Stove continues to be in strongest demand, egg being next and chestnut third.

Midwest Feels No Pick-Up

Nothing happened during the past week to strengthen the coal market in the Midwest. Storage stocks are by no means exhausted yet, either in the hands of railroads or industrials, so that demand for all grades continues light. Enough coal is coming out of western Kentucky to reduce the effect that might have been created had the strike in that region stopped all work. The resumption of work in Kansas, Oklahoma, Arkansas and Missouri, with a slight freight-rate advantage from those mines to some of the Missouri Valley markets, has started a flow of fresh coal from that territory. All in all, the Midwest remains unencouraged by any element that might put strength into the trading. A little contracting is going on all the time, but the volume of it is small.

Production in Indiana and Illinois continues at rock bottom. Neither state shows any improvement from the average 20 to 30 per cent of recent weeks. In the southern Illinois field little is moving except steam sizes, for which there is some demand. The Mt. Olive field is practically at a standstill. The Standard field is moving out some 2-in. lump, but there is no domestic market. Mines supplying railroad coal are about the only ones working. A good many unmarried miners have left these fields for parts unknown. Unrest is noticeable among those with families who cannot move so easily.

Business is practically stopped at St. Louis. There is no domestic tonnage moving and wagonload steam is just barely in evidence. The public seems a little inclined to put off buying this year, although prices are down to rock bottom. Country business is at a standstill, excepting a little trade in chestnut anthracite. Country steam shows a little activity here and there and the demand for screenings in outside markets continues good.

Kentucky Trade Is Slow

The Kentucky market is very dull, although the Big Four, Southern and Louisville & Nashville railroads have been taking a fair amount of coal. It is reported that the Wisconsin Steel Co., operating at Benham, Ky., has been moving some industrial fuel to its mills and also to the

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

	~		1		· ·						
Low-Volatile, Eastern	Market Quoted	Mav 14 1923	Apr. 28 1924	May 5 1924	May 12 1924†	Midwest	Market Quoted	May 14 1923	Apr. 28 1924	May 5 1924	May 12 1924†
Smokelesslump	Columbus	\$6.25	\$3.40	\$3.40	\$3 30@ \$3 50	Frenklin III lump	Chicago	\$3.80	\$2.75	\$2 75	\$2 50@ \$3 00
Smokeless mine run	Columbus	4 10	2 25	2 25	2 20@ 2 35	Franklin III minerun	Chicago	3 10	2 35	2 35	2 25@ 2 50
Smokeless screenings	Columbus	3 75	1 85	1 85	1 75@ 2 00	Franklin Ill sereenings	Chicago	1 75	2 15	2 15	2 10@ 2 24
Smokeless lurun	Chicago	6 10	3 10	3 10	3 00@ 3 25	Control III lump	Chicago	2 30	2 60	2 60	2 50@ 2 7
Smokeless mine run	Chicago	3 85	2 10	2 00	2 00	Central III. mino tun	Chicago	2 10	2 10	2 10	2 00@ 2 2
Smokeles lump	Cincinnuti	6 00	3 50	2 35	2.00	Central, III. mine run	Chicago	1 85	1 00	1 00	1 80@ 2.0
Smokeless mine sun	Cincinnati	4 25	2 10	2 05	1 750 0 00	Lentral, III. screenings	Chicago	3 35	2 85	2 85	2 75@ 3 00
Smokeless miller un	Cincinnuti	4 10	1 85	1 75	1 50@ 2.00	Ind. 4th Vein mine mun	Chiengo	2 85	2 35	2 35	2.75@ 2.50
*Smokeless mine run	Roston	6 85	4 45	4 40	4 35@ 4 50	Ind. 4th Vein concernings	Chicago	1 85	1 95	1 05	1 006 2 0
Clearfield mine run	Boston	2 75	2 05	2 00	1 60 0 0 05	Ind. 4th Vein Screenings.	Chieago	2 85	2 35	2 35	2 25@ 2.50
Cambria mine run	Boston	3 60	2 50	2.55	2 000 0 75	Ind. 5th Vein mine min	Chicago	2.00	2 10	2 10	2 00@ 2 2
Somerset mine run	Boston.	3 10	2 25	2 30	1 750 0 50	Ind. 5th Vein mmerun	Chicago	1 65	1 80	1 80	1 75@ 1 8
Pool I (Nevy Star dard)	New York	3 75	2 85	2 85	2 75@ 3 00	Mt Olivoiump	St Louis	1.02	2 85	2 85	2 75@ 3 00
Pool I (Newy Standard)	Philadelphia	4 00	3 00	3 00	2 75@ 3 25	Mt. Olive mine mine	St. Louis		2.50	2 50	2.750
Pool I (Newy Standard)	Baltimore	1.00	2.00	5.00	4.05 (G) 7.65	Mt. Olive appenings	St. Louis		2.00	2.00	2 00
Pool 9 (Super Low Vol)	New York	2 90	2 20	2 20	2 00@ 2 40	Standard lump	St. Louis	2 60	2 15	2 15	2 00@ 2 34
Pool 9 (Super Low Vol.)	Philadelphia	3 00	2 20	2 20	2 00@ 2 45	Standard mine mun	St. Louis	1 80	1 05	1 05	1 90@ 2 0
Pool 9 (Super Low Vol.)	Baltimore	2 75	1 80	1 80	1 75@ 1 90	Standard mile run.	St. Louis	1 50	1 80	1 80	1 75@ 1 00
Pool 10 (H Gr Low Vol.)	New York	2 50	1 85	1 90	1 70@ 2 15	Weet Key lump	L avieville	2 60	2 35	2 25	2 25@ 2 5
Pool 10 (H Gr Low Vol.)	Philadelphia	2 40	1 85	1 85	1 70 2 00	West Ky. Jump	Louisville	1 00	1 60	1.60	1 50 6 1 9
Pool 10 (H Gr Low Vol)	Baltimore	2 25	1 65	1 65	1 60@ 1 70	West Ky, milerun.	Louisville	1 60	1 65	1.65	1 506 1 7
Bool H (Low Vol.)	New Vork	2 20	1 50	1 55	1 50 0 1 75	West Ky. screenings	Chice as	2 60	2 25	2 25	2 00@ 2 5
Pool 11 (Low Vol.)	Philadelphia	2 00	i 50	1 50	1 30@ 1 70	West Ky, lump	Chicago .	2.00	1.60	1.60	1.50@ 1.7
Pool 11 (Low Vol.)	Baltimore	2 00	1 50	1 55	1 50@ 1 60	west Ky. minerun	Unicago	1 00	1 00	1 00	1. 30(00 1.7
LOOLLI (TOM ACH ACH	(Michieles).	2.00	1.50	1.55	1.50(8, 1.00	South and Southwes	t				
High-Volatile, Eastern	1					Die Seem (ump	Disminshow	2 70	2 60	2 80	2 70 6 2 0
Pool 54.64 (Gus and St.)	New York	1 85	1 50	1.50	1 40@ 1 65	Dig Seam nump,	Diriningnam .	2 70	2 00	2 00	2.70(0, 2.9
Pool 54 64 (Cawand St.)	Philadelphia	1.85	1.55	1.55	1.45@ 1.00	Big Seam minerun	Birminghani .	2.05	2 00	2.00	1.75(a) Z.Z
Pool 54 64 (Gas and St.)	Raltimore	1.80	1.60	1.35	1 40@ 1.50	Big Seam (washed).	Birmingham	2.35	2_20	2.20	2.00@ 2.4
Dittehurgh an'd gas	Pittehurgh	2 85	2 40	2 40	2 30@ 2 50	S. E. Ky. lump.	Chicago	3.75	2.25	2 25	2.00@ 2.5
Pittaburgh Se G gas	Pittsburgh	2 0)	2 10	2 10	2 00@ 2 25	S. E. Ky. mine run	Chicago	2 85	L_60	1.60	1 25@ 2 0
Pittaburgh mine pup (St.)	Pittsburgh	2 00	1 85	1 85	1 75@ 2.00	S E Ky lump	Louisville	4 00	2 10	2 10	2 00 @ 2 3
Pitteburgh alack (Gue)	Pittaburgh	1 75	1 40	1 35	1 30@ 1 40	S F Ky minorun	Louisvillo	2 50	1 50	1 50	1 25 @ 1 7
Kanawha lumn	Columbus	3 25	1.40	1 22	+	S.E. Ky. milerun	Louisville .	2 00	1_00	1.00	1.23(00 1.7
Kanawha mine sun	Columbus	2 20			‡	S. E. Ky. screenings	Louisville	1.90	1.10	1_05	1 00(a. 1 2
Kanawha minerun	Columbus	1 75			‡	S. E. Ky. lump	Cincinnati	3.35	2.25	2_05	2 25 @ 2 5
W Vo lump	Cincinnati	3 75	2 35	2 00	2 10 . 2 25	S. E. Ky. mine run	Cincinnati	2 00	1.35	1.35	1.25@ 1.5
W Ve ges mine sup	Cincinnati	2 20	1 40	1 35	1 35@ 1 50	S. E. Ky. screenings	Cincinnati.	1 80	1 10	85	1.00@ 1.1
W Va steep minerup	Cincinnati	2 20	1 40	1 35	1 35 @ 1 50	Kansaa lump	Kansas City	3.85	4.50	4 50	4 50
W. VA. Steam mile run.	Cincinnati	2 00	1 05	00	1 00@ 1 10	Kansas mina sun	Kansas City.	2 15	3 25	2 25	7.00
Weeking lump	Columbus	2 80	2 45	2 45	2 25@ 2 65	Kausas mine run	Kansas City	5 25	5.45	5 25	3,50
Hocking mino sup	Columbus	1 05	1 60	1 60	1 50@ 1 75	Kansas screenings	Kansas City.	2 60	2 50	2 50	2.50
Hocking mmerun	Columbus	1.60	1 30	1 30	1 25 0 1 45						
Ditta No Sluron	Cleveland	2 00	2 35	2 40	2 10@ 2 75	Gross tons, f.o.b. ves	sel. Hampton	Roads.			
Ditto No 8 mino sur	Cleveland	2 15	1 80	1 85	1 85@ 1 95	+ Advances over previo	us week shown	in heavy	type	decliner	in italice
Pitta No Bassoningt	Cleveland	1 60	1 50	1 55	1 150 1 55	† On attiles	Li toni shown	areaty	cype,	accimes	III BUGISCO
PITE, NO. OVCIPEUTIZE	Cieventitu	1.00	1.50		1.4000 1.00	t on strike.					
0			C	. D	•	1 . 0					

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

	Market	Freight	May 14,	1923		1924		1924+
	Quoted	Rates	Independent	Company	Independent	Company	Independent	Company
Broken	New York Philadelphia	\$2.34 2.39		\$7.75@\$8 35 7.90@ 8 10	\$8.20@ \$8.50	\$8.00@\$8.75 8.60@ 8.75	\$8 50@ \$8 60	\$8.00@\$8.75
Egg.	New York Philadelphia	2.34 2.39	\$8 50@ \$11.00 9 25@ 9 50	8.00@ 8.35 8.10@ 8.35	8 75(a 9 00 8 35(a) 9 50	8.35@ 8.75 8.70@ 8.75	8 75(a 9 25 8 35@ 9 50	8 35@ 8.75 8 70@ 8 75
Stove	New York Dhiladalaha	5_06 2.34 2.30	12.00 ⁽²⁰⁾ 12.50 8.50 ⁽²⁰⁾ 11.00	7.20(@ 8.25 8.00(@ 8.35	7.68@ 7.77 8.75@ 9.25	7.73@ 7.81 8.35@ 9.00	7.68@ 7.77 9 00@ 9 50	7.73@ 7.81 8.35@ 9.00
Stove	Chicago*	2.39 5.06 2.34	9.23(<i>a</i>) 9.30 12.00@ 12.50 8.50@ 11.00	8.15(a) 8.35 7.35(a) 8.25 8.00(a) 8.35	8 70@ 9 60 8.03@ 8.17 8 65@ 9 00	8.75@ 8.95 7.94@ 8.14	8.70@ 9.60 8.03@ 8.17	8.75@ 8 95 7.94@ 8 14
Chestnut	Philadelphia	2.39 5.06	9 25@ 9 50 12 00@ 12 50	8.15@ 8.35 7.35@ 8.35	8 75@ 8.85 7 90@ 8 03	8.70@ 9.60 7.81@ 7.99	8 75(0 9 25 8.75(0 8 85 7 90(0 8 03	8 35(0 8.85 8 70(0 9 60 7 81(0 7 99
Range Pea	New York	2.34	6.30@ 7.25	8.30 6.00@ 6.30	4 75@ 5 50	8.60 5.50@ 6.00	5 50@ 6.00	8 60 5 50(<i>a</i>) 6 00
Pea	Chicago*	2.14	7.00(a) 7.25 7.00(a) 8.00	6.15(a) 6 20 5.49(a) 6.03	5 75@ 6 25	5.75@ 6.00 5.36@ 5.91	5.75@ 6 25 5.36	5 75@ 6 00 5 36@ 5.91
Buckwheat No. 1	Philadelphia	2.14	2 25(a) 5.50 3.00(a) 3.50 1.50(a) 2.50	3.50(@ 4_15 3.50 2.50	2 25@ 3 00 2 50@ 3 00	3_00@ 3.15	2 35 <i>@</i> 3 00 2.50 <i>@</i> 3.00	3.00@ 3.15 3.00
Rice	Philadelphia New York	2.14	2.00@ 2.50 1.00@ 1.50	2.50	2 00@, 2 25	2.00(<i>a</i>) 2.25 2.25	1.90(@) 2.25 2.00(@) 2.25	2.00(a) 2.25 2.25
Barley Birdseve	Philadelphia New York	2.14 2.22	1_15@ 1_50	1.50	1.40@ 1.65	1.50	1.50	I 50 I 50
1 Mattern fab mar	+ Advances over	provious mool	abown in board	and dealines to d	4-11-1			1 00

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



Weighted average price. \$2.05 \$2.05 \$2.07 \$2.73 This diagram shows the relative, not the actual prices, on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

Lakes for movement north, but there doesn't appear to be much contract business developing on lake shipments, and the big utilities and industrials are buying lightly. Retail business has slumped off. Eastern Kentucky operators, as a result of favorable wage scales, are enabled to obtain some business on a price basis that otherwise would be denied them on account of freight hauls.

Although more than half of the western Kentucky field is down on account of the District No. 23 strike, the remaining mines are not busy. However, orders for prepared are light, which is resulting in screenings being scarce and comparatively high. Prices of prepared coal are holding rather firmly.

Little Doing In Northwest

• Business is extremely slow throughout the Northwest except in a little hard coal to meet immediate demand during a slight cold spell. Price reductions on many soft coals at the Head-of-the-Lakes did not stimulate trading much. Variations in anthracite prices are noticeable. While at Duluth a 10c. advance was made May 1 and further advances were promised for the rest of the summer, at Milwaukee slight decreases were put into effect to stimulate early buying.

Shipments from the Duluth docks last month were good. In all 15,683 cars went out as against 13,619 in the preceding month and 7,555 in April of last year. Nearly all of this coal went to the railroad companies' yards as little selling was done. The larger number of cars (9,043) went from the Duluth side of the harbor, which is unusual. This was done to save tax assessment for coal on docks as of May 1. To date 41 cargoes of new coal have been unloaded at the Duluth-Superior docks for a total of 318,090 tons. Ten of the cargoes, aggregating 79,230 tons, were anthracite. Eight more cargoes are ready to enter the harbor, but the ice cap has closed down and many boats are held out in the lake.

All coal of the defunct Superior Coal & Dock Co. has been sold. This removes much cheap coal from the market.

At Milwaukee the May reduction in soft coal has had the effect of stimulating business to some extent. Milwaukee receipts of coal by lake thus far this season aggregate 68,576 tons of anthracite and 113,599 tons of soft coal. Lake freight rates have been reduced 50c. per ton. The coal movement promises to be slow during the summer.

West Is Largely Inactive

Few mines of the Southwest have resumed work as a result of the recent wage agreement in Kansas City between operators and miners. Some "no bills" accumulated on Kansas tracks even during the month's suspension, the product of independent mines, the operators of which signed with the miners before the association did. Only a heavy storage demand could result in operation to any extent in the Southwest this summer.

The market in Colorado shows very little change. Sales are at a standstill. Mines worked on an average of twenty hours last week and a number of them report "no bills." The operators' weekly reports show more than 30 per cent of the time lost attributed to "no market." The railroads also report a considerable decrease in the shipments of commodities from the coal producing districts.

Utah operators are moving very little coal. Although working time is but two days a week, "no-bill" cars are increasing. Mining and cement companies are buying a little coal, but outside of these industries the demand is at a very low point. The domestic demand is for intermediate sizes. Nothing has been said regarding storage rates this year. It is unlikely that the operators will make a reduction.

Solid Undertone at Cincinnati

Business in Cincinnati had a more solid footing during the past week. Gradual elimination of the producers south of the river who threw coal on the market whether it was needed or not, the passing of a bulk of the tonnage that was coming on consignment and a minimum of "distress" fuel are the outstanding causes. Increase in Lake business and buying by large consumers whose stockpiles are at a level where they must replenish also have been helpful. The retail trade has settled down to an even tenor for the month apparently, for there has been no change in quotations. Low bids on county business is the only disturbing factor, but this is not taken to mean any great change in prices. An increased tonnage from the Kanawha River with more coming over the elevators at Huntington is the feature of the river trade. Specialized coals are quoted as follows: Block, \$3@\$3.50; egg, \$2.50@\$3.

The Columbus market notes a better feeling in stea a trade. A large part of the railroad contracting has been done and Hocking Valley operators got their share of the tonnage; quite a number of smaller agreements also have been placed. Steam requirements are not as heavy as formerly and some of the larger consumers are still using reserves. Some school coal also is moving and public utilities are coming into the market again. On the whole there is a better tone to the trade although there has been no especial strengthening in quotations. Producers have reduced output to a point where there is little distress coal on the market. Retail trade is quiet. Lake trade is slow.

Cleveland operators and jobbers report an extremely quiet market and even consumers who have no stocks on hand are buying from week to week in small quantities rather than a thirty-day supply. Furthermore, there seems to be a slight slowing down in industrial activity, and consequently consumption is much below normal. However, the New York Central reports an upturn in the volume of loads moving through its Cleveland terminals, as compared with the daily average a week or so ago. The increase has been gradual and consistently unward during the past ten days. With a slightly increased production of lump coal for Lake, the quantity of slack in the market has become more abundant, and spot prices on slack and nut and slack have receded about 10c. per ton. There is practically no change in spot prices on other grades.

Line demand at Pittsburgh continues extremely poor. The market is spotty from day to day, but a week's average shows no material change in volume. Railroad demand is still the chief support of the market. Prices are unchanged.

Practically all the non-union mines in Somerst, Cambria and Westmoreland counties, in the central Pennsylvania district, have gone back to the 1917 scale and operators are thus able to compete with southern conditions and, as a result, mines are operating on practically full time, with the exception of the Berwind-White Coal Co., at Windber, which is still paying the higher rates and is working two to three days per week. A further evidence of the effect of the new scale is shown in the loadings for the week ending May 3, which totaled 10,439 cars, as against 9,954 for the previous week.

The trade at Buffalo continues quiet. Slack is in better supply and the prospect of an advance in price seems to have disappeared.

Price Recession Feared in New England

In New England there is no material change either in prices or in the attitude of buyers. The industrial situation is in no wise improved, and the more pessimistic in the trade are apprehensive lest quotations again recede. In fact, prices for spot loading f.o.b. vessel at Hampton Roads are 10c. less than a week ago. While numbers of operations are working but one to two days weekly there are still moderate accumulations at the Virginia terminals, and the agencies find themselves pressed to relieve cars. In no direction is there hope of a much better market during May.

Prices per gross ton on cars Boston also have eased somewhat within a few days; \$5.35 is quoted, as compared with \$5.50 a week ago, although a few factors are trying to get as high as \$5.75. The market is governed, however, by those larger distributors who are obliged to make room for weekly arrivals.

All-rail from central Pennsylvania there is only scattering demand at minimum prices. Except within a narrow zone east and west of the Connecticut River and well away from tidewater there is no market whatever for grades other than a few specialties.

Better Tone in Seaboard Markets

Consumers at New York are making some interesting inquiries which are expected to develop into real business. As a whole, the market is in better shape. This is not apparent, however, by comparing the price list with previous weeks, but in the general attitude of the trade. There appears to be more optimism abroad and those coal men who a few weeks talked dull trade until August are advancing their revival date a few weeks at least. Less coal is coming to the New York tidewater and more strength is apparent, causing less tendency to cut prices in order to sell coal. The daily average of cars on tracks at the piers last week was less than during the previous six days. Philadelphia finds coal still difficult to move, and more

Philadelphia finds coal still difficult to move, and more mines than ever are reported as being closed down or working short time. Big consumers are sticking to stockpiles for coal, and the fact that apparently more coal is being consumed than is being mined is really the one favorable aspect to the market. The recent slight flurry in tide movement seems to have quieted down about as quickly as it arose, as the past week has seen no clearances of





coal at all. Bunkering remains on the same plane as maintained during the past ten weeks or more.

Although production has been greatly curtailed in some sections of West Virginia apparently it is still in excess of current demand and possibly of consumption. Within the last few weeks, if anything, there has been a slight increase in the tonnage mined and loaded as observed in increased shipments to the Atlantic piers. The fact that there are so many mines in idleness in northern West Virginia has created a small increase in business for such mines as are running and has resulted in a scarcity of screenings, but so far there has been no advance in prices worth mentioning, either as to high or low volatile.

There was an almost complete cessation of activities last week in the Baltimore market. Few dealers are now chancing heavy shipments to tide for the spot market, as there has been difficulty in getting rid of this coal without heavy demurrage charges. The export movement, which for some time has been the one encouraging feature, has taken a drop for the first week of the present month.

Demand at Birmingham is extremely light, consumers showing little interest in solicitations and buying only for immediate needs. The Frisco Railroad has closed its contract for fuel for the next twelve months, this contract having been pending for several weeks. Business in export and bunker channels is negligible at present, a limited tonnage moving to Cuban and South American points.

Brisk Tone in Anthracite Trade

Weather conditions have helped consumption to such an extent that many New York retail dealers have not been able to fill their orders as rapidly as they would have liked. All domestic sizes are in strong demand. Stove coal leads the list and straight lots of that size bring the maximum quotation, but when taken with chestnut or egg may be had for 15c. to 25c. less. Chestnut is the hardest of the three coals to move. Pea is in good demand also. The steam coals are easily moved, with rice and barley the strongest.

An improved tone marks the trade at Philadelphia this week. Cool weather has helped in a measure to keep up a fair demand for current consumption. Dealers report consumer ordering slow and not much stimulated by increased mine prices. The retail price situation remains unchanged. Steam sizes have in no wise improved.

Baltimore retailers report a fair amount of orders, but that supplies on hand are adequate to meet the situation. The public apparently is taking advantage of the fact that prices probably will not be raised by retailers until July 1, and are endeavoring to get coal in cellars in many cases.

Coke Output Continues Steady Decline

Spot furnace coke remains quotable at \$3.60@\$3.75. Foundry coke is in poor demand and really standard foundry coke remains quotable at \$4.75 to \$5.25. Output of beehive coke during the week ended May 3 was 205,000 net tons, according to the Geological Survey, compared with a production of 224,000 tons during the previous week.

Car Loaungs, Su	piusage	es and	Snortag	jes
			All Cars	Coal Cars
Week ended April 26 Previous week Same week in 1923	•		878,892 876,923 963,694	117,572 124,752 180,127
	Surplu All Cars	oal Cars	-Car S	hortage
April 30, 1924 Previous week Same date in 1923	329,489 321,832 13,556	193,06 189,60 2,84	1 0 9 35,282	17,634

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Con I and

May 15, 1924

U. S. Coal and Coke Imports During March

(In Gross	Tons)	
	1923	1924
Anthracite	33,252	13,727
Bituminous	319,941	53,972
Imported from:		
Jnited Kingdom	137,688	7,485
Canada	168,936	40,926
apan		5,560
ustralia	13,311	
)ther countries	6	
Coke	8.829	7.361

Export Clearances Week Ended May 10, 1924

- ,		
FROM BALTIMO	RE	
For Argentina:		Tons
Br. Str. North Anglia		.5,144
For Italy:		
Am Str. Valdieri	• • • • • • • • •	. 6,782
Am. Str. Lampasas	• • • • • • • • •	. 1,994
FROM HAMPTON F	ROADS	
For Africa:		
FT. Str. Mont Agel for Algie	rs	. 968
Br. Str. Clydemede for Buen	os Aires	.6.001
For Brazil:		
Br. Str. Denis for Para		. 505
Braz. Str. Manue for Rio de Br. Str. Saint Patrick for Riv	Janeiro	.0,558
Janeiro		.5.741
Br. Str. Hubert for Para		. 601
Br. Str. Naxtergate for Rio d	e Janeiro	. 6, 618
For Canada: Br Sebr Maid of France for	St John	507
Ital. Str. Valverde for Mon	st. John	6088
For France:		,
Fr. Str. P. L. M. 20 for Mars	seilles	.8,042
FT. Str. P. L. M. 21 for Mars	seilles	. 8,211
Ital. Str Madison for Civita	Vecchia	4 661
Ital. Str. Monte Nero for Po	rto	. 1,001
_ Ferrajo		.6,945
For Porto Rico:		
For West Indies	amo	. 305
Br. Str. Maindy Court for H	Puerto	
Plata		.5,634
Nor. Str. Fram for Fort de	France	.3,908
Hampton Roads Pior	Situati	0.70
thampton hous i lei	Situatio	JU
N. & W. Piers, Lamberts Pt.:	May 1	May 8
Cars on hand	985	1,124
Tons on hand	61,183	71,241
Tonnage waiting	140,410	95,658
Virginian Piers, Sewalls Pt.:	10,000	17,000
Cars on hand	1,151	1,091
Tons on hand.	78,850	76,800
Tonnage waiting	10 773	94,824
C. & O. Piers, Newport News:	10,775	0,500
Cars on hand	1,070	960
Tons on hand	53,070	45,693
Tonnage waiting	625	16 450
		10,150

Pier and Bunker Prices, Gross Tons

PI	E	RS						
		May	3		ľ	May 1	0†	
Pool 9, New York \$	4.	70@\$	5.	00	\$4.	75@ \$	5_0	00
Pool 10, New York	4.	40@	4.	75	4.	60(a)	4.8	35
Pool 11, New York	4.	25(a	4.	50	4	40@	4.5	50
Pool 9, Philadelphia	4.	70@	5.	05	4	. 70@	5.0	05
Pool 10, Philadelphia	4.	45(a	4.	80	- 4	. 45(a	4.1	80
Pool 11, Philadelphia	4.	30(a	4.	55	4	. 30@	4.3	55
Pool 1. Hamp. Roads	4.	35@	4	50		4 40)	
Pool 2. Hamp. Roads	4	15@	4	25		4 2	5	
Pools 5-6-7 Hamp. Rds	4.	00@	4	15		1.00	5	
BUI	NE	KERS						
Pool 9. New York	5	00@	5	30	5	05 G	5 3	30
Pool 10. New York	4	706	5	05	Ā	90(a	5	15
Pool 11 New York	4	550	4	80	4	70.00	4	20
Pool 9 Philadelphia	5	000	Ś	40	5	00(0)	5	40
Pool 10 Philadelphia	á	75@	5	nn.	Á	75(0)	5	00
Pool 11 Philadelphia	Å	500	Ă	80	4	500	4	80
Pool 1 Hamp Boads	A	356	A	50		4 5	n"''	
Pool 7 Hamp. Roads	Å	156	4	25		4.2	ř	
Poole 5.6 7 Hamp. Roads	Ā	000	4	15		4 1	2	
1 0018 5-0-7 Hamp. Rus							3	

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

Quotatio	ns by Cable to C	oal Age
Cardiff:	May 3	May 10†
Admiralty, large. Steam smalls	27s.6d.@28s. 18s.@19s.	27s.6d.@ 28s.6d. 18s.@18s.6d.
Newcastle:		
Best steams Best gas Best bunkers	27s. 24s.6d. 23s.6d.@24s.	268. 25 8. (238.
† Advances over type: declines in <i>it</i>	previous week	shown in heavy

Foreign Market And Export News

British Coal Market Disorganized; Production Slumps Further

The Welsh steam-coal market is suffering from disorganization and instability. The Easter holidays have in most cases been unofficially prolonged by the miners on account of the bril-liant weather, and in consequence output has fallen and foreign buyers have made heavy purchases of American and German coal. These are some of the factors that account for the instability in South Wales. In addition merchants holding contract supplies are offering them at lower rates than the collieries. In these circumstances values have a marked tendency toward weakness.

Pit stoppages are numerous owing to the accumulations of stocks and the stormy weather interfering with exports. The recent decline in prices has attracted more business and buyers are refusing further concessions. The strike of trimmers at Leith threatens to spread to other ports.

The Newcastle market is suffering from a spring lassitude, and, all round, much the same conditions prevail as in South Wales.

Production by British collieries during the week ended April 26, a cable to Coal Age states, was 4,049,000 tons, according to the official reports. This compares with 4,994,000 tons in the week ended April 19 and 5,843,000 tons during the week ended April 12.

French Coal Market Steady In All Lines

The French coal market is firm and steady in all lines, but disposals are extremely rare in the North and Pasde-Calais, despite a continual increase in production. Imports of British coal are still large, but prices are more accessible with the decline of Sterling.

Owing to the new taxes imposed on the collieries, some of them intend to raise the prices of industrial fuel 15 to 30 centimes per ton.

Demand for household coal has slackened in anticipation of summer rates.



The Belgians having definitely established summer rebates at 8 fr. per ton for May and June, 4 fr. in July and 2 fr. in August, the Paris coal traders

have issued their summer schedule. Supplies of coke to the O.R.C.A. during April averaged 19,500 tons daily, which is slightly under the usual record, due to the slackening of activity occa-sioned by the Easter holidays. The price of coke for April will be 150.75

fr., all charges included. The prices of reparation coal have just been lowered 10 per cent in Belgium, and similar action is expected soon in France.

Trade Steady at Hampton Roads; **Prices and Tone Firm**

Business at Hampton Roads is holding its own, with no apparent increase in activity in the market. Prices hold firm, with scarcity of Pool No. 2 as perhaps one of the striking features of the market.

Coastwise and bunker trade is fair, but foreign movement shows an inclination to drop off. Old orders are being completed and no new contracts for overseas shipments are to be noted in the market.

The tone of the market is firm, and the outlook shows little prospect of any immediate increase in trade.

Exports of U. S. Coal in March **By** Countries (In Gross Tons)

March 1923 March 1924

Exported to:		11441 CH1 1724
France	3,495	34.084
Italy	. 54,971	43,702
Netherlands	53,452	
Other Europe	80,306	
Canada	920,629	822.175
Mexico.	5,568	7 643
Br. West Indies	17,493	12 335
Cuba	51,173	28 960
Other West Indies	7,924	32 925
Argentina	8 140	53,650
Brazil	6 579	43 113
Chile.		7 067
Egypt	2 498	2 080
French Africa		4,700
Other countries	7.742	23 118
Coke	97 521	112 048
		112,040

News Items

From

Field and Trade



ALABAMA

The Big Sand Iron & Steel Co., Birmingham, has changed its name to **Big Sandy Coal & Iron Co.**, and is said to be planning improvements to its properties in Tuscaloosa County, near Coaling.

Advices from Cullman, in Cullman County, state that much undeveloped mineral lands are being bought up in that section by L. B. Musgrove, of Jasper, organizer of the Deepwater Coal Co., recently formed, and that Henry Patillo, of Cullman, also is buying up lands in Cullman and adjoining counties, which it is believed carry valuable coal deposits.

The Crow Coal Co., which was recently incorporated, has been organized with Charles B. Crow, president and W. W. Bankhead, secretary and treasurer. It has 80 acres under development, with a daily output of about 250 tons, at Jasper.

The Stith Coal Co., Brown Marx Building, Birmingham, of which A. B. Aldridge is secretary, has bought the Drifton mines in Walker County, including about 15,000 acres of land, drift mines, about forty houses, store and other appurtenances.

The Bankhead Coal Co., Bankhead, of which W. D. Leake is general manager, has let the contract for a steel tipple of 3,000 tons per day capacity.

COLORADO

Substantial progress has been made in driving the Moffatt tunnel. Already Hitchcock & Tinkler, Inc., the contractors, have completed 2,200 ft. of the water tunnel at the east end of the bore and 2,500 ft. on the west end. The main railroad tunnel has been completed 320 ft. in from the east, and the narrow heading which precedes it is now 1,700 ft. long. Although the contract calls for completion of this railroad bore under James peak by July, 1927, the contractors now announce that they will have the job done in 1926. The tunnel is expected to give considerable impetus to the development of the great Routt County coal region, now handicapped by doubtful transportation.

An effort to reduce miners' wages in Colorado caused a strike of the 100 men at the Broadhead mine of the Temple Fuel Co. at Aguilar early in May. The company had announced a reduction of 15 per cent in wages with a statement from President F. R. Wood saying that, because of the 50 per cent drop in the price of coal, the mine had been running at a loss for the preceding 60 days. The union men, presided over by Mike Livoda, vice-president for the Colorado district, voted to suspend operations until the old wage scale is restored. The strike is legal, according to the State Industrial Commission, to whom miners appealed several days ago. The company has made no attempt to operate the mine during the dispute. Mr. Wood also is president of the Colorado & New Mexico Coal Operators' Association.

Colorado coal mines yielded 10,336,-735 tons in 1923, an increase of 333,125 tons over the output for 1922, according to the annual report of James Dalrymple, State Coal Mine Inspector. During 1923 the average number of men employed in the mines was 13,-277, with an average of 169.9 days worked per mine.

The National Fuel Co. is being sued by Albert S. Nelson, a farmer in Colorado, for \$103,000 on the ground that its coal operations have so disturbed the surface of land under which they leased coal rights, that farming is impossible. Nelson charges that some of the holes sunk "in all sections" of his ranch are "40 and 45 ft. in diameter."

ILLINOIS

Work has been resumed by the Rex Coal Co. at its mine at Warner, near Coal Valley. A new airshaft has been sunk and two shifts of men are now being employed.

A total of 150 miners employed by the Madison County Coal Co. have **petitioned for a receiver** for that company to be appointed by the Circuit Court of Madison County at Edwardsville, Ill. The miners in the petition state that the company was unable to meet a \$13,000 payroll. Thomas R. Harris of St. Louis is president of the company. Slow collections are said to have caused the company embarrassment.

John Foster, who for several months had been superintendent of Mine No. 1 of the Chicago, Wilmington & Franklin Coal Co., at Benton, has been transferred to Herrin, where he has been appointed superintendent of Mine A of that company.

H. M. Prigge & Co. has been incorporated at St. Louis with a capital of \$20,000 and will mine and manufacture coal, coke, fuel, pig iron, fireclay, sand, and silicates. The incorporators are Henry M. Prigge, Martha J. Prigge and William Meinholtz.



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Marshall M. Ennis was elected trustee of the Drakesboro Coal Co., Inc., at Drakesboro, Muhlenberg County, by the creditors at a meeting held on May 1, before John L. Stout, referee in bankruptcy. Ennis has been serving as receiver since the company went bankrupt. The stock consists of a coal mine and store.

H. J. Elliott, for 24 years well known throughout the Middle West as a representative of the Pittsburgh Coal Co. and for seven years the Chicago manager of that company, has resigned and is now spending the summer in his home country in and near Minneapolis, Minn., fishing and resting. His business plans for the future have not yet matured. J. D. Sauerberg, who has been with Mr. Elliott every year of the 24 in the Chicago office, is the present manager.

INDIANA

Representatives of the U. S. Bureau of Mines and of the Indiana mine inspection bureau recently conferred with John Hessler, president of District No. 11, United Mine Workers, to consider preliminary details of the State firstaid meeting to be held June 28 at Princeton.

The Dering Coal Co. has announced that Dering mine No. 6, at Clinton, which has been closed for some time, will be reopened immediately. This is one of the largest mines in the Clinton field.

Two new Indiana mining companies have been organized. The St. Clair Coal Co. has been incorporated at Bicknell by Charles Goodman, Thomas Thomas, Henry Brown, Patrick Penman, Alexander Campbell, Charles Holt, Lewis Steffy, John Thomas and Howard Taylor, all of Indianapolis. The Emcke Coal Co. has been incorporated at Terre Haute with a capital stock of \$100,000 to mine coal in that section of the state. The incorporators are W. L. Mace, John H., and A. J. Beasly, all of Terre Haute.

The Brooks-Hoffman Coal Co. has been incorporated at Vincennes, for the purpose of doing a general mining business. The incorporators are Lewis Brooks, Nolan McClure, William E. Ruble and Thomas J. Brooks, all of Vincennes, and Harry H. Hoffman of Petersburg, Ind.

The Patoka Coal Co., which operates a stripping mine at Rogers, six miles east of Petersburg, closed recently, awaiting a revival in the coal markets —if any. The company has been operating all winter and this is the first suspension in a year. Other mines in Pike county are operating only from one to three days a week.

W. H. Leland, Chicago, president of the Leland Coal Co., closed a deal May 6 at Evansville with Jabez Wooley, president of the Warwick Coal Co., for the Polk Patch stripping operations, near Boonville, in southern Indiana, at a reported price of \$500,000. The Leland company now owns nine operations in Indiana, Illinois and Kentucky.

KANSAS

The Central Coal & Coke Co., of Kansas City and Pittsburgh, has purchased nearly 30,000 acres of land south of Coffeyville, all but 2,000 acres of which is in Oklahoma. The Santa Fe R. R. is to build a spur to the new field, development of which is under way.

KENTUCKY

The Dempster Coal Mining Co. of St. Charles, of which Geo. R. Dempster is president, is reported to have acquired the plant of the bankrupt Harris Collieries Co., at Island, and is planning the removal of the equipment to Earlington.

It is reported from Pinesville that several union miners and their families are moving from the property of the Liberty Coal & Coke Co., on Straight Creek, following expiration of the thirty days' eviction notices posted by the company in early April. On April 30 Judge Cochran, of the federal court, Eastern Kentucky division, in a hearing at Richmond, indicated that federal authorities would eject the miners if they did not move, and the court granted a preliminary injunction against United Mine Workers of District 19, the Straight Creek local union, and forty-two miners, who it was related were living in company houses.

Official denial has been made by the Ford mining interests that the Pond Creek mines of the company have been shut down as a protest against the presence of union organizers in the field. The company has been paying its men a little above the union scale but has operated open shop and has been having some difficulty with the union as a result.

Two men were killed and a third was excavated alive following a cave-in of a small area in a low level of the Black Diamond mine of the Pacific Coast Coal Co., April 28.

NEW YORK

John T. Roberts, for several years general sales agent of the Widnoon Coal Mining Co., has organized the Widnoon Coal Co., to be operated in the general bituminous trade, as the mine has been closed for some time, waiting for better business. The new company will be incorporated later on, business proceeding outwardly as before.

George A. Hughes, secretary of the Lake Erie Coal Co., has sold his interest in it and organized the Lake Erie Fuel Corporation, with office at 812 Prudential Building, Buffalo. The incorporators are himself, S. A. Crone and H. B. W. Haff, of New York. W. L. Rowland, of the older company, son of the president, has been appointed Northern sales agent of that company, which is an auxiliary of the Richland Coal Co., of Wheeling, W. Va.

It is announced that the Buffalo office of the J. P. Burton Coal Co., of Cleveland, will be closed on June 1, owing to poor business and it is understood that other branches will be discontinued for the same reason. A. R. Stubbs has been head of the Buffalo office.



©Harris Ewing

Walter D. Rogers

Resigned May 1 as executive secretary of the National Retail Coal Merchants Association, which position he had held for six months. He was with the U. S. Coal Commission, for which he made an investigation in Boston and also made special cost studies in New York and Washington. D. C. He also was one of the authors of the commission's report covering the retail trade.

OHIO

Operators in the southern Ohio field are trying to get miners in that district to hold another referendum on a joint conference to change working conditions in the district. Several weeks ago it was voted down by the miners' organization with but onethird of the members voting. Operators believe that if another vote is taken it might be carried. It is planned to lessen the cost of dead work in order to reduce the cost of production in the district and thus enable the operators to compete with the West Virginia fields.

Coal Production in Ohio totaled 40,-726,615 tons in 1923, according to a report to Herman Witter, Director of Industrial Relations. This compares with 27,526,555 tons mined in 1922, a gain of nearly 50 per cent. The 1923 output has been exceeded only three times since statistics have been kept, the peak year being 1920, when 45,227,077 tons was produced.

The Yorkville Mining Co., Yorkville, is having a switch laid from the Wheeling & Lake Erie R.R. to receive shipments from its mine. The Yorkville company has supplied large industrial consumers by truck and boat since its mine was opened a few years ago. Considerable surprise was shown by the Cincinnati trade when the figures were announced for the county bids opened May 6. On West Virginia mine run the low was \$3.79, and for smokeless \$5.70. This is inclusive of freight and haulage and with a penalty clause attached.

Upon application of the West Virginia Rail Co., of Huntington, with a claim of \$24,039, ancillary receivers in Ohio for Jewett, Bigelow & Brooks were appointed in the U. S. Court at Cincinnati by Judge Smith Hicken-looper. E. L. Douglass, vice-president of the company in charge of operations, and John L. Richey of the Cincinnati Credit Men's Association, qualified under bonds of \$25,000. They had been appointed receivers for the company by Judge A. M. J. Cochran in a hearing before the U. S. District Court of east-ern Kentucky. The only objection to the ancillary receivership was put in by Louis H. Stone and his wife, who claimed to be indorsers of notes up to \$700,000. The receivers sought to have stockholders enjoined from interfering with them. E. H. Jewett, president H. M. Jewett (also president of the Paige Motor Co.) and Walter Brooks, treasurer, were in Cincinnati recently but refused to say what conclusions they had arrived at as to the future conduct of the company.

Frank L. Stein and William S. Harman, receivers of the Maynard Coal Co., called a meeting of creditors May 10 to discuss the advisability of accepting an offer of \$650,000 and accrued unpaid taxes amounting to \$8,500 for the properties of the Superior Coal & Dock Co. at Duluth. Creditors were not inclined to accept, but wanted more time for consideration. The receivers will put the question up to Judge J. E. Sater, of the federal court, for final action.

PENNSYLVANIA

James A. Gleason, member of the executive board in District No. 1, United Mine Workers, will be grand marshal of the miners' parade to be held in Scranton at 1 o'clock on the afternoon of May 30, in connection with the unveiling of the John Mitchell monument on the Court House Square. Miss Kathryn Mitchell, daughter of the late union chief, will unveil the statue.

A settlement of the strike which tied up the 8,000 mine workers of the Panther Creek Valley collieries of the Lehigh Coal & Navigation Co. since April 14 was effected last week by Thomas Kennedy, president of District No. 7, United Mine Workers, and James A. Gorman, secretary of the Conciliation Board.

The Philadelphia & Reading Coal & Iron Co. has instituted a reforestation campaign. A large force of men is engaged in planting 25,000 Japanese red pine and 25,000 Scotch pine trees in the vicinity of Mount Carmel and Kulpmont. About 25,000 Japanese red pine also are being planted in the outskirts of Shamokin. The work is in charge of William Smith, district forester of the company. ern part of Scranton. The Glen Alden Coal Co., of Scranton, has completed the purchase of 5.08 acres of coal land in the fifth ward of Scranton from Eleanor E. Hoxie. The consideration was not made known.

tion and with it the Hampton Tower

and several other buildings in the west-

With the visit of W. H. Grady and W. E. Decker, representing the Kem-merer interests, of New York, con-trollers of the Mount Jessup Coal Co., reports were current in Scranton of the reorganization of the coal company and resumption of operations. About a month ago all collieries of the company in Jessup ceased operations, throwing 2,000 men out of work.

The Philadelphia & Reading Coal & Iron Co. has slushed 1,500,000 sq.yd. of old mine workings underneath Mount Carmel borough and is continuing the work.

Officials of District No. 1, United Mine Workers, are investigating re-ports to the effect that the miners' certificate law is being violated in the district. They believe a large number of immigrants have obtained certificates through false statements and if they find evidence to confirm their belief they will institute proceedings, they say.

The Philadelphia & Reading Coal & Iron Co. has erected a separate wash house with shower baths, booths and dressing rooms at Donaldson, midway between the old West End and Middle Creek operations, at a cost of between \$20,000 and \$25,000.

The Dodson Coal Co., operating at Beaver Brook and Locust Mountain, has moved steam shovels and other equipment at Locust Mountain to Raven Run, where a new stripping operation is to be started. The Dodson company has one of the biggest strippings in the world at Locust Mountain.

Appeals from the state anthracite tax, taken to the U.S. Supreme Court by coal companies, will not be heard until next autumn, as the court will be unable to reach them before the summer recess. Several million dollars of taxes are involved.

There is an increase in the number of evening mining classes conducted in Pennsylvania this year and the number of pupils is greatly increased over last year, according to the State Depart-ment of Public Instruction. "Mining courses in evening schools were organized this year in thirty-two school districts of the state," said Dr. J. George Becht, State Superintendent of Public Instruction, "and more than 1,500 men were enrolled in the different courses. The growth is remarkable in view of the fact that only six school districts in the state conducted courses in mining last year. This increase is due to the co-operative efforts of the State Department of Mines, State College and the Department of Public Instruction."

UTAH

The Utah Oil Refining Co. of Salt Lake City has definitely decided to use coal for fuel purposes and its plants will be changed accordingly. This will provide a new outlet for 600,000 tons of coal a year. It is stated that through a new refining process it is now possible to dispose of the oil that was used for fuel at a rate that would make it unprofitable to continue to use it for fuel.



F. F. Green

Recently promoted to the superin ency of the Valier Coal Co. mine at V Ill. He formerly was chief engineer. superintend-ne at Valier,

The U. S. Land Office at Salt Lake City offers for lease a tract of public coal land containing 1,818 acres in the Castlegate district of the Book Cliffs coal field about 3 miles northeast of Castlegate on the Denver & Rio Grande Western R.R. Lease for this tract will be at a government royalty of 10c. a ton for coal mined, a minimum investment in mining operations of \$50,000 during the first three years of the lease, a minimum production of 60,000 tons a year beginning with the fourth year of the lease. Leasing of this land is made in accordance with the general leasing law.

WEST VIRGINIA

The tipple at the plant of the Mor-gantown Gas Coal Co. at Murray, formerly known as Mine No. 93 of the Consolidation Coal Co., collapsed late in April, under the weight of several loaded cars and a string of empties. The accident happened when a Monongahela Ry. engine was backing empties into the siding, with loaded cars in front.

The Fairmont-Chicago Coal Co. has completed work on its new tipple at Barackville and the first coal was dumped over the structure late in April. Approximating 1,200 tons of coal a day are being loaded over the new tipple but it is proposed to gradually increase the amount to 2,000 tons a day. The new tipple is equipped with shaker

screen, picking table and loading boom equipment. W. E. Watson, of Fairmont, is president of the company.

The Island Creek Coal Co. has let contracts to the Hatfield Construction Co. for the construction of hard roads in Logan which will entail an expenditure of \$310,000. Roads to be paved include the Whitman's Creek, Trace Fork and Copperas transportation routes. All of the contracts, which call for the surfacing of about nine miles of roads with concrete, are expected to be com-pleted by Sept. 1. The Island Creek company has already expended more than \$100,000 in grading the projects now to be paved.

The Rachael Gas Coal Co. has disposed of its Rachael mine and coal holdings at Downs, W. Va., near Fairmont, to the Bertha Consumers Coal Co., of Pittsburgh, Pa. The considera-tion, as shown by the deed filed, was \$536,000. The Rachael plant is one of the new ones in Marion County and is a large mine with modern equipment.

John C. Lowry, Jr., has been ap-pointed general superintendent of the New River Collieries Co. Mr. Lowry is a graduate of Pennsylvania State College and had his start with the company.

Industrial Notes

A new coal company, launched at the outset of May was the Marmon Coal Co., with headquarters at Buckhannon. in the Upshur County field. This concern is capitalized at \$75,000. Chieffy interested in the new concern are A. M. Minerd, Ir-vin Christner, George Christner, A. L. Quimet, Jr., and Amie Quinett, all of Buckhannon.

The McClanahan Pocahontas Coal Co. has just been organized to operate in smokeless territory, headquarters of the company to be at Cotter. The new cor-poration is capitalized at \$100,000. Among those identified with this company are K. S. McClanahan, of Amigo; William Mc-Clanahan and D. E. Claypool, of Cotter; W. A. Harrah and W. K. Harrah, of Backus. Coal Co.

Backus. The Wingo Manufacturing Co. has been incorporated at St. Louis, Mo. with a cap-ital of \$300,000 and will manufacture and sell mine doors, automatic gates and switches. The incorporators are William W. Wingo, Joseph K. Cosinski, Helen Cosinski, Minnie Wingo and George W. Royce. Minnie Wingo and George W. Royce, Paul J. Pirmann, Fulton, Mo. Craig Miller. president of he Man Coal Co., of Man, W. Va., accompanied by his chief engineer, Mr. Barrett, were in Cin-cinnati recently looking over plans and new equipmnet for developments at their mines. The Lehigh Coal & Navigation Co. is

The Lehigh Coal & Navigation Co. is about to commence the construction of a steel tipple in the Panther Creek Valley region, near Lansford, Pa. The cost, in-cluding machinery, will be about \$1,-500,000.

500,000. Contracts have been let for building a washery for the Harleigh Coal Co., at Har-leigh, near Hazleton, Pa. The plant has been designed by H. M. Chance & Co., and will be equipped with one Chance sand flotation separator 15 ft. in diameter. The steel structure will be bolted—not riveted— so that it can be moved when the culm banks to be worked are finished. Much of the material and machine equipment has already been fabricated.

The Candlemas Coal Co., of Silver Brook, near Hazleton, Pa., has begun the con-struction of a new anthracite breaker, which will be equipped with electrically operated machinery for an output of about 3,000 tons daily.

The Wilson Welder & Metals Co., Inc., will move its plant and general offices May 1 from 132 King Street, New York City, to the Wilson Building, Hoboken Factory Terminal, Hoboken, N. J. Increasing de-mand for welding machines and welding wire necessitated larger quarters.

Traffic News

Assigned-Car Order Date Now Set Back to Aug. 1

The Interstate Commerce Commission has again postponed the effective date of the assigned-car order, pending the consideration of evidence heard on rehearing, which resulted from protests against the Commission's original findings. Under the new order the rule becomes effective Aug. 1. The order was entered originally on June 13, 1923, and was to have become effective Sept. 1 last year. It was then postponed until Oct. 1, then until Nov. 1 and later until Dec. 1, 1923. The next effective date was Jan. 1, 1924. It was then postponed until Feb. 1, then April 1, and on March 3 the commission ordered that it should become effective June 1.

Railroads Must Provide Proper Facilities for Shippers

The U.S. Supreme Court on May 5 reaffirmed the principle that a state regulatory body has the right to require railroads to establish reasonable facilities for shippers and for the public. The case was an appeal of the Norfolk & Western Ry. against the Public Service Commission of West Virginia, which had directed the carrier to establish a crossing for vehicular traffic across its tracks at McCarr Siding, Mingo County, W. Va., near Blackberry City, the siding being primarily for the use of the Allburn Coal Co. A merchant of Blackberry City applied for the crossing order on the ground that he could not get a vehicle across the company's tracks to get freight consigned to him which was dumped at the siding. The state court's ruling upholding the order was affirmed.

Shipper Not Liable for Freight Except by Contract

A shipper is not responsible for freight charges unless there is an expressed or implied contract to this effect, the U. 3. Supreme Court held May 5 in affirming the decision of the lower courts in the appeal of the Louisville & Nashville R.R. against the Cen-tral Iron & Coal Co., of Alabama. In 1917 the Central company sold ten carloads of coke to Tutwiler & Brooks. Before delivery, the latter sold the coke to the Great Western Smelter Corporation of Mayer, Ariz. Delivery to the railroad was made by the Central company consigned to Mayer, "on order of Tutwiler & Brooks." The smelter corporation paid \$5,082 freight charges, on demand when the coke arrived. It was discovered by the railroad three years later that the tariff rate was \$8,545 and an effort was made to collect the undercharge from the Central company, which resisted and denied responsibility. The Supreme Court held that shipment by the Central company "on order" relieved it of responsibility and that collection should be from Tutwiler & Brooks or the smelter corporation, neither of which had been sued.

Appeals Set Ahead

The Interstate Commerce Commission has advanced the dates for hearing appeals from the New England rate division decision. The case of the Central Railroad of New Jersey has been set for May 22; that of the Delaware & Hudson for May 26, and that of the Southern and Western carriers for May 28. The Jersey Central has asked for relief from contributing to the extra division awarded the New England lines. The Delaware & Hudson has asked, in addition to this, that the northern lines of its system be made beneficiaries of the decision, as are the New Haven, the Boston & Maine, the Maine Central, the Central Vermont and the Rutland.

Southwest Rates Are Reduced

The coal-mining industry of eastern Oklahoma and western Arkansas should be benefited by a decrease in freight rates provided for by an order of the Interstate Commerce Commission just announced at Washington. Reductions were not as great as were requested by the complainants, the Southwestern Interstate Coal Operators' Association. The rate now charged on shipments of lump coal from the Arkansas-Oklahoma group to Kansas City is \$3.28 per ton. The complainants sought a rate of \$2.49 and were granted one of \$2.65. Other rates from the various shipping points and to various destinations are in this proportion.

Coming Meetings

Retail Coal Dealers Association of Texas. Nineteenth annual convention, May 20 and 21, Vernon, Texas. Secretary, C. R. Goldman, Dallas, Texas.

Pennsylvania Retail Coal Merchants Association. Twentieth annual meeting and exposition, Commercial Museum, 34th and Spruce Sts., Philadelphia, Pa., May 22-23. Secretary, W. M. Bertolet, Reading, Pa.

International Railway Fuel Association. Sixteenth annual convention, May 26-29. Chicago, Ill. Secretary-Treasurer, J. B. Hutchinson, 600 Michigan Ave., Chicago, Ill.

The American Society of Mechanical Engineers. Spring meeting May 26-29, Cleveland, Ohio. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

American Wholesale Coal Association. Annual convention, White Sulphur Springs, W. Va., June 3-4. Secretary, G. H. Merryweather, Chicago Temple Bldg., Chicago, Ill.

West Virginia Coal Mining Institute. Annual meeting June 3 and 4, Elkins, W. Va. Secretary, R. E. Sherwood, Box 1026, Charleston, W. Va.

The National Foreign Trade Convention. June 4-6, Boston, Mass. Secretary, O. K. Davis, 1 Hanover Square, New York City.

National Retail Coal Merchants' Assoclation. Annual meeting, Hotel Virginian, Bluefield, W. Va., June 4-6. Secretary, Walter D. Rogers, Transportation Building, Washington, D. C.

Southwestern Interstate Coal Operators Association. Annual meeting June 10, Kansas City, Mo. General Commissioner, W. L. A. Johnson, Keith & Perry Bldg., Kansas City, Mo.

Illinois & Wisconsin Retail Coal Dealers Association. Annual meeting, June 10-12, Delavan, Wis. Secretary, I. L. Runyan, Great Northern Bldg., Chicago, Ill.

Illinois Mining Institute. Annual meeting, June 12-14 from St. Louis via boat down the river. Secretary, Martin Bolt, Springfield, Ill.



Newly Developed Single- and Three-Phase Motors

Two induction motors of a new type have recently been placed on the market by the General Electric Co. One of these is the single-phase constantspeed motor designed for operation on 40-, 50- or 60-cycle circuits and suitable for interchange on 110- or 220volt alternating-current power lines. This motor is made in sizes varying from $\frac{1}{2}$ to 10 hp. Although designed on the squirrel-cage induction-motor principle, it entirely eliminates shortcircuiting switches heretofore considered essential. Although the oper-ating characteristics of this motor are similar to those of the usual induction motor, it has a high starting torque with low current demand. Both the maximum and accelerating torques are approximately 200 per cent of full-load torque without any low points during acceleration. The no-load and full-load speeds are both close to synchronous speed, thus the regulation is exceptionally good for this type of motor.

The stator winding consists of simple concentric polar windings arranged for double-voltage connections. The rotor consists of a cast squirrel cage winding and a repulsion wire winding of the multiple type with equalized commutator connections to insure uniform distribution of armature currents.

The new polyphase induction motor is designed for 60-cycle circuits and is made in sizes ranging from ½ to 15 hp. It is rated on a 40-deg. continuousduty basis. The electrical improvements embodied in this motor comprise reduced heating, higher efficiency and higher power factor at full and fractional loads and increased starting torque. The maximum torque ranges from 275 per cent to 300 per cent of its full-load synchronous value. The accelerating-torque curves are free from the dips common to most squirrelcage induction motors.

The oil reservoirs on these motors have been enlarged from 50 per cent to 100 per cent. Other improvements in-



Improved Motor With Base, Pulley and Conduit-Box Connection

This new single-phase induction motor has unusually high starting torque at low current values. The maximum torque obtainable is nearly as high as that possible with three-phase motors.



Cast Rotor of Polyphase Induction Motor

This illustration shows the cast rotor of one-piece construction. It is claimed that this design eliminates the possibility of any high resistant spots in the winding.

clude a new method of directing the ventilating air to prevent dirt from settling on the windings, and a "cast" rotor of one-piece construction, having no joints nor high-resistant spots.

Stoker Controls Fuel Bed From Hopper to Ashpit

Many new and interesting features of design have been incorporated in the improved Taylor stoker manufactured by the American Engineering Co., Philadelphia, Pa.

Distributing rams of the old flat-end type have been replaced by a series of reciprocating pushers which form the bottom of the retort. This construction is said to give absolute control of the fuel bed from hopper to ashpit; it is claimed that it will keep the entire fuel bed constantly clean and free from clinker and give the full benefit of underfeed firing. Each ram can be adjusted so as to give a speed that is graduated throughout the retort so as to meet the burning characteristics of any fuel. Once these rams are ad-justed for a particular kind of fuel, all further control can be obtained by a single adjustment at the front of the stoker.

Another new feature is a planetarygear power box. This unit is claimed to be more efficient than the usual worm reduction gear. It has no clutches, yet it provides 50-per cent speed variation. Whenever it is necessary to stop the stoker, the power box can be thrown readily into neutral position. An attachment to this box permits simple, positive adjustment of the distributing rams from the front of the stoker. The speed-control lever can be shifted from high to neutral or low speed with little effort.

TUYERES INDIVIDUALLY MOUNTED

The tuyeres are designed to change efficiently the static pressure of the air to velocity pressure and direct the air so that it is utilized to the best advantage. Each block of four tuyeres is individually mounted and can be removed without disturbing adjacent blocks.

Removable dead-plate tips are held in place by a key which can be taken out by hand. Just below the tips are reciprocating extension grates which are said to insure the burning of any fixed carbon remaining in the ash. It also assists in the control and removal of the latter.

The power dump swings above the horizontal to remove adhesions from the bridge wall. These plates are exceptionally heavy and can be removed by simply knocking out two keys. Ashes can be dumped and the wall cleaned in but a few seconds without any manual labor.

The front of the stoker is supported

spur-géar power box

Individual refort strut supports on individual struts, accurately machined and designed to carry a front wall of any thickness and height. They transfer the load to steel work below the fireroom floor, thus eliminating the stoker channel in the front wall.

The stoker is built with from 15 to 45 tuyeres and a fire bed, even though long, can be accurately controlled by the distributing rams which are constructed of accurately machined duplicate parts.

Three-Cylinder Motor-Driven Air Drill for General Use

A lightweight non-reversible pneumatic drill suitable for light drilling up to f_{σ} -in. diameter holes, and reaming up to f_{σ} -in. diameter has been developed by the Ingersoll-Rand Co., No. 11 Broadway, New York City. This is a light-weight drill which

This is a light-weight drill which may be fitted with either breast plate, feed screw or grip handle and which thus is made adaptable for a wide variety of work. The construction of this machine is similar to that of Nos. 6 and 600 drills which this company developed two years ago and which were powered for drilling up to §-in. diameter.

The features of this type of machine are briefly: light-weight aluminum case, with steel bushings cast in all the bearing holes and the throttle hole; cast-iron cylinders which are renewable and interchangeable and special threecylinder motor. The renewable cylinders are a valuable feature, as any cylinder after long service, easily may be replaced and the motor made as good as new at slight cost.

The three-cylinder motor has the rotating parts all accurately balanced, eliminating vibration and reducing wear and tear on the machine. The drill is economical in air consumption and cost of maintenance, is highpowered, and, moreover, every part is readily accessible for inspection.



Lightweight Air Drill

New Stoker Varies Travel of Fuel on Any Section of Grate L Accurately machined parts, many of which are exact duplicates, control the fuel bed over the entire range of operation. The ram box is claimed to be non-sifting and can be renewed by the replacement of a few small parts.

The working speed of this drill is 700 r.p.m. when supplied with 90-lb, air pressure. It may be fitted with a breast plate, feed screw or grip handle.