

COAL AGE

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Passing the Buck

EVERY new piece of equipment gives a chance to pass the buck, and many a superintendent is a past master in the art. As a result, many a device is condemned for faults which cannot rightly, but can speciously, be charged to it. If the new method or the new machine is imposed from above or from some other department than that of the production head—mine superintendent or foreman—it is liable to be opposed. Every effort is made to charge it with all the stray costs which that operating head desires to dispose of satisfactorily to himself and his reputation.

Most cunningly does he contrive to pass the blame to this interloping introduction, and only patient watchfulness and discrimination will assure a fair trial to the new system or device. That is why a discussion of this matter *in camera*, in a full meeting of all concerned, is advisable, before, after and during the experiment. The facts openly and exhaustively discussed will bring all the merits and demerits to light, place all the details of the experiment where they can be clearly viewed, and promote friendly effort to get the best out of the opportunity.

As a rule, however, executives hear but one side and pass judgment. Did the mine superintendent propose it, it is a success. Did he oppose it, it is a rank failure and the cause of many ills with which it may have only a remote or perhaps no connection? With men of many varying qualities and backgrounds—administrational, mining, mechanical, electrical—no subject has been settled till the judgment of all has been sedulously sought. We can no more determine the value of a piece of equipment by hearing the opinion of one man than we can comprehend the value of a building by showing alone a plan of one floor, a front, a rear or a side elevation. We need plans and elevations from several points of view. Then we shall know at least something about our building, and not until then.

Coal Dust "As Is"

TESTS of coal dust in experimental mines and galleries seem to be of the substance as it might be rather than as it is. No one has taken, we believe, the floor material as it is and subjected it to tests. They have not taken it in its natural depth and coarseness and tried it out. Perhaps it might give a false feeling of confidence, for at any time a different condition might arise.

It might be ground finer, it might be less damp, it might have the finer material on top, it might have less roof scale in it or it might be rendered more nocuous by the presence of less locomotive sand. Of course, it would be difficult to reproduce the exact condition in an experimental mine. The floor dust loaded into cars would not reproduce the various vertical and hori-

zontal zones, the lines where scurrying feet had worn a path of comminuted dust and lines where mules had kicked up enough broken bottom to render the dust relatively innocuous.

Still the mines as they are might be simulated better. Dust from the most unfavorable place and travel zone in the mine might be taken and tested. It would be more suggestive of what might be expected than dust which was ground to such a fine, mealy consistency that nothing like it was ever seen underground. It is like taking FFFF and drawing conclusions as to the F variety of black powder.

Finally we might add: Never overprove anything. People always suspect an overstatement. The skepticism of those who see the velvety dust in the experimental mine is a case in point. They do not recognize it as coal, not their coal at any rate. But if you put the material they have daily trodden carelessly underfoot in a sure-enough mine like that at Bruceton and put a buster shot in the face like some of those they know unconscionable miners are using and get a severe explosion, you put real fear in their hearts. This is the stuff they have handled, these are the conditions they face—and in that homely thought lies conviction.

In this connection it may be said that when members of the South Staffordshire and Warwickshire Institute of Mining Engineers visited the Eskmeals Experimental Station in England and viewed an explosion of coal from the Kilburn seam of the Butterley Colliery, Nottinghamshire; L. Holland and H. H. Ridsdale criticized the experiment saying: "We consider it most important that the experiments should be carried out on actual samples of road-dust, large and small, taken from representative roads in the pits of that area."

Wonder What Farrington Thinks About?

THE famous cartoonist who draws an almost daily series of picture "strips" wondering what the cigar Indian, and the Statue of Liberty, the handsome collar ad man and other such notables think about, ought to turn his attention for a moment to Frank Farrington, president of the Illinois district of the United Mine Workers. What *does* he think about these days, anyway? And why has he postponed his state convention for two months to May 13? Farrington's problems typify those of many union miner leaders of the country.

His puzzles are enough to make any man lie awake nights and think. There he is with 90,000 union miners in a solidly unionized state. Not a pound of coal can be dug except under the union agreement continued for three years. Unless the usual sixty or seventy million tons of it are produced in Illinois each year of the three, a vast deal of suffering must be borne by his miners. Thousands of them must be squeezed

out of the industry by shutdowns that have already closed three quarters of the state, and the rebel element in Illinois, long dangerous to Farrington's regime, will have new and effective ammunition to use against him, especially in the union election next December. Although he does not particularly hanker to remain president of the district, he does not want to be kicked out.

But in spite of this danger in the reduction of Illinois coal, what can he do to prevent it? Illinois must have a market or it can't produce. Kentucky, a competitor on the south, is headed for non-unionism in those portions which are not already beyond union control. If it doesn't go all the way, it will at least make union contracts in the western end of the state that far undercut the wages of Illinois. That means a certain loss of market by Illinois. The Southwest district operators are determined to have a contract that will materially reduce costs and they probably will have their way. That will mean more loss of Illinois business in Kansas, Missouri and Nebraska. The Northwest docks are heavily loaded with cheap coal and are in position to stock up again this summer with more good coal at prices that Illinois cannot meet in Minnesota unless freight rates are altered. All this adds menace to Farrington.

What is the logical thing for him to do? He cannot violate the new three-years contract so far as wages are concerned. Therefore, that method of remedying the Illinois situation is out of the question. But, as everybody knows, there are clauses in the working agreement in Illinois which add materially to the cost of producing coal in that state. He could change some of them, thereby enabling Illinois mines to hold certain escaping markets. Thereby, also, many miners would hold escaping jobs. Are most unemployed Illinois miners convinced yet that such a course is necessary? Perhaps they will be by May 13. Perhaps, also, by that time certain outlying districts such as the Southwest will have signed agreements that will establish a precedent for Illinois. Is this what Farrington is thinking about?

Slow Progress in Standardization

IN COAL mines we have not the compelling force for standardization that the railroads have. Each mine stands by itself. There is no interchange of equipment. The cars at the Katastonka mine do not have to be coupled with those at the Katie No. 5, and the cars on the roads of one operation do not have to run on the other. Nor do the Katastonka cars have to be repaired at the shops of Katie No. 5. Consequently, the local need for standardization is not supplemented with the need for intercompany interchange.

It is interesting to note the conditions that favored the adoption by the railroads of the Master Car Builders' coupler. When they standardized couplers many of the railroads were already faced with the necessity of changing their coupling equipment. When the change was made they could just as well go to the standard as to some other kind of coupling. One kind of change was no more burdensome than another. Some standards were helped by the fact that they related to equipment that most of the cars did not have at all and might not have had today if the laws had not compelled its introduction.

Standardization will profit by constant advocacy because mines have often, when bought, only the meagerest of equipment. They need almost entire renovation, and when that is the case the scrapping of the old equipment is more economical than the supplementing of some of it and the saving of the rest. Many a plant thus renovated maintains a foolish standard when it would do better to adopt one that is more general. It is often an alibi and not a real excuse to say that the reason why the gages are diverse is because old mines were bought and they had a narrow gage when the purchase was made.

In many cases it would have been well to take the whole string of cars to the scrap heap. They were not fit to run. In fact they had to be almost entirely rebuilt any way. The tracks could probably have been widened on the old ties. Perhaps the ties were too rotten or too short for that but if that were the case the track should have been condemned. Most of these old gages have been kept because the subject of scrapping the old equipment was not even considered and no standard had been suggested.

However, there are some cases where an attempt to conform to standard would scarcely pay until there is a revolution in the industry. Such a change is likely to come soon. When coal is brought by scrapers or conveyors to the main roadways and the cars do not have to enter the rooms, they will be made larger and when larger cars are purchased the gage can be made standard. Only the track in the main roadways will have to be changed. Today a revision in track gage would mean relaying all the room tracks. That in some mines would be profitable, for the roads in the rooms where laid by miners are so crooked that the safety and economy in haulage that would result from their relaying would pay for the operation. Still it takes more courage to undertake the work if the change would involve all the present trackage and not solely the tracks in the main roadways.

Then again concentration of workings will reduce trackage considerably and make it less costly to change the gage. Every considerable change in method of operation makes standardization more possible and it certainly would be helped if the manufacturers could offer a lower price wherever certain standards were adopted.

It is paradoxical but true that standardization is promoted by a general break in standards. A new development causes a discarding of much of the old equipment, and the tendency is, or at least should be, to adopt at that time standards which till then were little other than an impossible ideal.

Off the Track

WRECKS were a daily occurrence on the railroads of past years. Now they are relatively unusual, and traffic moves steadily. The railroads certainly have profited by the change. But the mines, they still have wrecks. They wouldn't be the same old mines without them. These derailments don't pay dividends, but you would imagine they did by the way the average manager makes provision for them. Many a mine would be making a profit if it did not have to write off so much for the destroyed equipment, wasted time, accidental injuries and repairs consequent on cars and locomotives leaving the track.



Careful timbering in Beech Bottom Mine, Power, W. Va.

Better Methods and Improved Equipment Increase Production at Beech Bottom Mine

By Locating Power Plant at Mine, Cost of Power Is Greatly Reduced—Means Adopted to Reduce Loss of Coal in Mining and to Save Unnecessary Handling of Slate

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CENTRAL stations for supplying power in the coal regions are now being built exclusively so near coal mines that the freight costs on the coal can be entirely eliminated. The disposition to locate power houses at some point on the railroad more or less remote from the mines is now recognized generally to be uneconomical. It is cheaper to transmit power at usual voltages over a transmission line 200 miles in length than to carry the coal to a central station by railroad an equal distance even though thereby it is possible to generate the power more conveniently to the center of load. The advantage of locating a central station at a coal mine situated somewhere near the center of distribution is even more clearly apparent. A comparatively recent development in the Panhandle region of West Virginia furnishes an excellent illustration of this tendency.

Headpiece portrays timbering at the junction between two roads and shows how the Winsor Power House Coal Co. supports bad roof by 60-lb. rails placed at 4-ft. centers.

On the Ohio River, at Power, W. Va., a village located about ten miles north of Wheeling, the West Penn Power Co. and the American Gas & Electric Co. operate the Windsor power station, which has a capacity of 180,000 kw. The station is located in proximity to the hillside tippie of the Beech Bottom Mine, owned and operated by the Windsor Power House Coal Co., a subsidiary of the companies just mentioned. The situation is clearly illustrated in the panoramic view, Fig. 3.

The operation of this central power station calls for a supply of 70,000 tons of coal per month, or say 850,000 tons a year. The Beech Bottom Mine has been equipped to produce coal from a tract of 10,500 acres at the rate of 1,000,000 tons per year. The mine is operating in the Pittsburgh No. 8 coal seam, which in this region is 4½ ft. thick. After making due allowance for probable loss in mining, it is estimated that this tract provides a reserve of 54,000,000 tons of coal, or more than a half-century's supply of fuel for the plant.

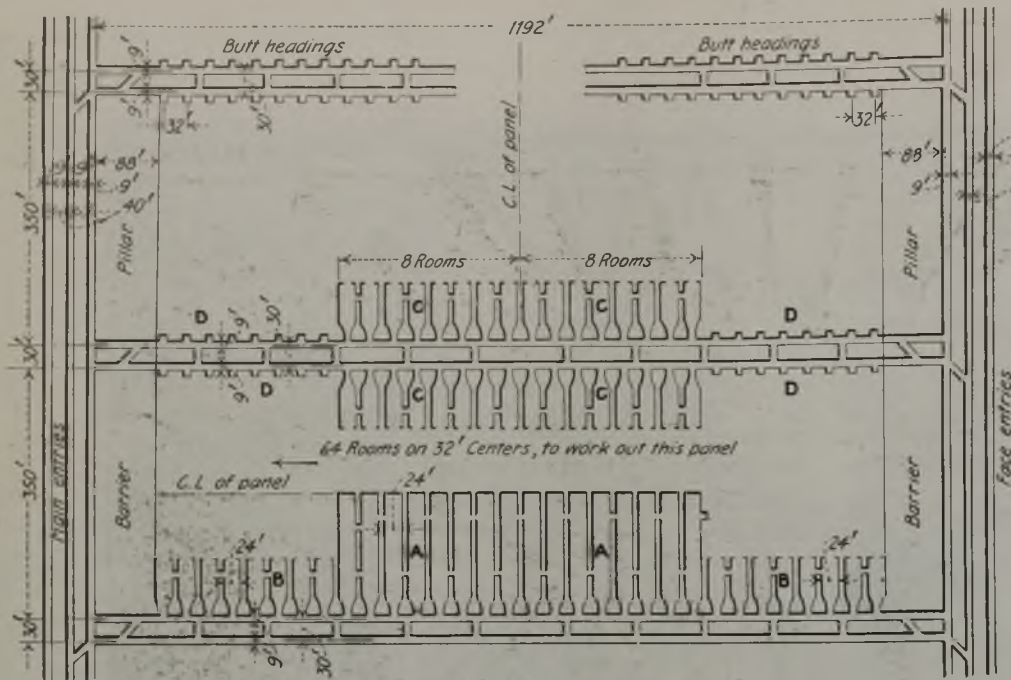


Fig. 1—Method of Working Panels

Two sets of eight rooms *AA* are driven up concurrently. When these sets are driven half way up two sets *BB* and two sets *CC* are started. Thus sets *AA* are finished when sets *BB* and *CC* are at mid distance. The pillars are not drawn. The center of the panel is worked out first, which is advisable, for the coal is hauled to both sets of face entries making it unnecessary to save the center of the panel when sets *AA* are completed.

Owing to bad roof, the mines in this region are small producers as compared with operations in other areas of the Pittsburgh seam. The plan of mining at this plant is to drive up rapidly short wide rooms separated by narrow pillars which are abandoned without any attempt at recovery. The present owners of the Beech Bottom Mine profiting by early experience in the operation of this seam and by the use of more modern equipment have increased greatly the percentage of coal recovered. Even though the pillars are still lost, a big saving is made because the rooms are all completed before a squeeze comes and prevents further mining.

A brief reference to the character of the overburden will serve to explain the peculiar roof conditions encountered in the operation of the mine. In the Pan-

handle region of West Virginia at least and particularly in the Beech Bottom Mine, the coal is overlaid with about 15 ft. of dangerous roof, consisting of a drawslate and laminations of coal and shale with 12 ft. of fireclay having a conchoidal structure. Above this is a great thickness of massive limestone that will not break except over a long span.

Because of this condition operators in the region believed that it was necessary to leave in the mine all room pillars, chain pillars and a large portion of the barrier pillars, for they could not be recovered with safety. Experience has shown that in this section the roof over a 24-ft. room will stay up for about four months when adequately timbered. After that the 15-ft. bed of drawslate, roof coal, shale and fireclay, between the coal and the limestone, weakens and begins to fall.

Any attempt to remove the pillars in the rooms would start a squeeze that would extend over the entire mine, closing the roads and aircourses completely.

When, four years ago, this property was first taken over by its present owners, it was the pronounced intention to equip the mine for putting out the production of from 3,000 to 4,000 tons of coal per day. Old-timers shook their heads knowingly saying, "It can't be done." But they were wrong, as a careful study of the conditions and the adoption of improved methods and equipment have since shown. On Feb. 13, 1924, the output of coal was 3,486 tons, which probably exceeds all records in West Virginia for a single opening on the Pittsburgh No. 8 seam.

At the time the Windsor Power House Coal Co. came

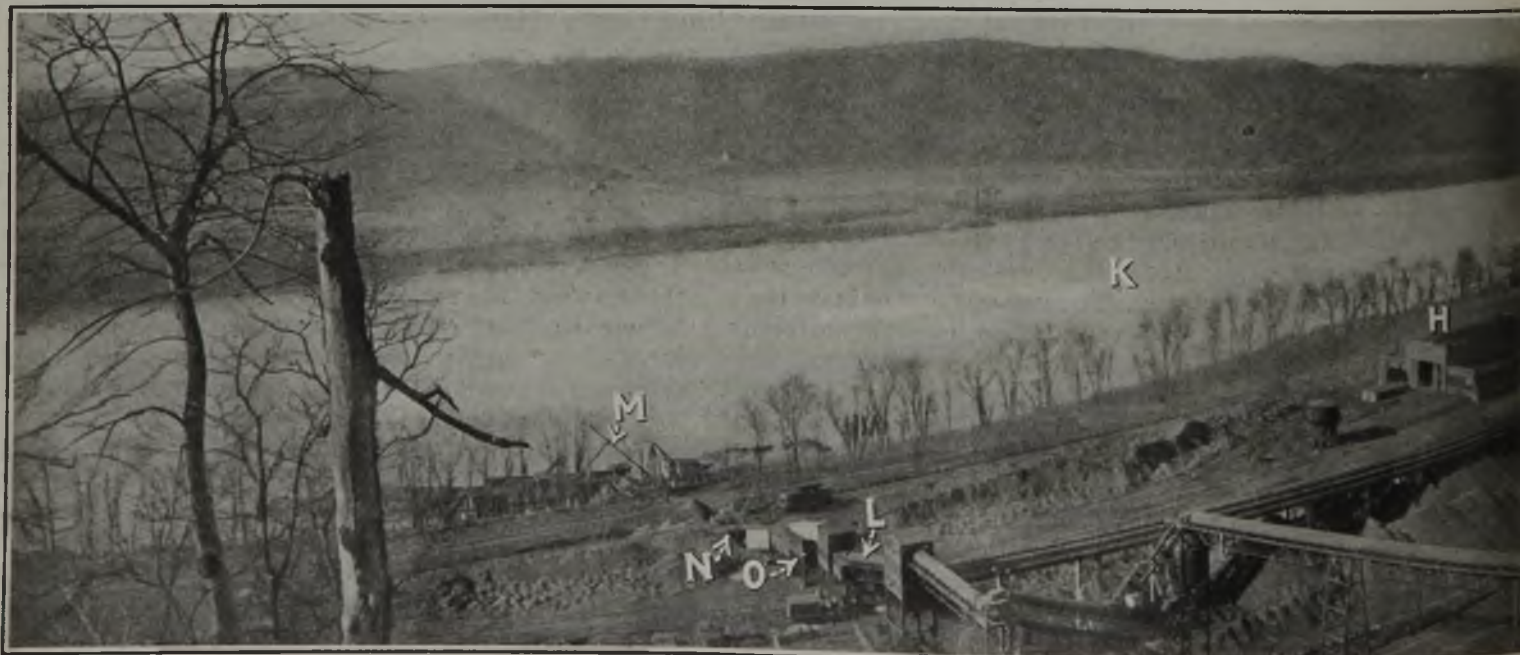


Fig. 3—Panoramic View Showing the Way in Which the Coal Brought Down from the Beech
 A, is the mine tippie; B, mine portal for loaded track; C, mine portal for empty track; D, rock bin; I, traveling crane; J, coal storage yard; K, Ohio River; L, conveyor system for

into possession of the Beech Bottom Mine, the daily tonnage did not exceed 1,000 tons, although the development in the mine was sufficient to have produced a larger output. The new company at once took steps to overcome the obstacles that hindered production. Its officials soon found that, in order to meet the requirements of the power station, the entire mine plant had to be rebuilt, the plan of the mine had to be altered materially, the system of haulage had to be changed and new shop buildings and a modern tippie had to be erected.

In the mine, the plan had been to drive face entries at intervals of 1,400 ft. and butt entries at intervals of 440 ft. On each side of the butt entries, in each of the panels thus formed, thirty-eight rooms were turned and driven 220 ft. long and 24 ft. wide, on 32-ft. centers. It was observed that many of these panels had to be abandoned before all the rooms were driven up and much coal was lost.

The new management decided that there must be shorter and fewer rooms in each panel. The plan adopted was to drive all entries 9 ft. wide. The main entries were to be driven on 40-ft. centers and face and butt entries on 30-ft. centers. The main and face entries were to be driven three or four abreast as conditions might require, the butt headings remaining on the double-entry system.

SPEED UP EXTRACTION TO OUTPACE FALLING ROOF

As shown on the accompanying map (Fig. 1), the face and butt entries were driven at intervals of 1,192 ft. and 350 ft. respectively. This provided for the driving of thirty-two rooms on 32-ft. centers, in each panel, and leaving a barrier pillar 83½ ft. wide to protect each face entry. The rooms were driven 24 ft. wide and 175 ft. long, measuring from the center line of the entry to the center of the panel where they would meet the rooms driven from the adjoining butt entry.

It should be observed, here, that where the room pillars are not to be extracted, there is not the same need of preserving a uniform line across the faces of the rooms. However, as shown on the map (Fig. 1), it is well to work out each panel by driving eight sets of



Fig. 2—Timbering Roof in Beech Bottom Mine

Rooms are driven 24 ft. wide with 8-ft. pillars, the latter not being recovered, because, if the roof is once broken, a widespread squeeze will do immense damage to the mine. The roof directly above the coal is weak; consequently a row of timbers is placed on each side of the track which is laid in the center of the room. The crevicing of the coal is not natural. The coal has been shot and partly loaded out. The shots failed in the middle to bring down the coal but fractured it as shown.

eight rooms each, in both directions, to the right and left of a pair of butt headings. As appears in the first panel at the bottom of the map, the two inner sets of eight rooms each, marked *AA*, are first started. When these have been driven half their distance, the two outer sets marked *BB* are commenced. At the same time, the four inner sets, *CCCC*, driven east and west from the second pair of butt headings are started. By following this system, when the sets *AA* have reached their limit and have been stopped at the center of the panel, the *B* and *C* sets have all been driven half their distance. At that time, the four outer sets *DDDD* are started from the second pair of butts.

It is claimed that this system provides a much desired concentration of the working places along the several butt entries where thirty-two or sixty-four rooms are being driven simultaneously. As indicated on the map, there is no through haulage on the butt entries, the coal from the rooms in each half of a panel being hauled to



Bottom Mine Is Carried to the Power House and How the Rock Is Handled by an Aerial Tram
E, aerial tramway for disposal of rock; *F*, crushers; *G*, power plant; *H*, machine shop and storehouse; *J*, river and rail delivery; *N*, discharge from railroad cars; *M*, delivery from river boats.

the nearest face entry. Though this increases the haul, in some cases, the plan has the advantage that track and wire may be torn up in rooms and on entries as fast as any section is finished.

In the rooms, 20-lb. rails are laid on steel mine ties. The track is carried up the center of each room to facilitate the loading of coal at the face. This is an advantage when the room pillars are not to be drawn. As shown on the map, all room-necks are bottle shaped and only enough coal is left in the entry stumps to hold the room safely open until it is finished.

CARRY LINE OF POSTS EITHER SIDE OF ROOM ROAD

In Fig. 2 is shown a view of the face of a room being driven up. It will be observed that a row of posts lines the track on either side. The posts are set on 4-ft. centers, with an 18-in. cap-piece at the roof. It is common practice also to set a row of posts, on 4-ft. centers, across the face of the room. Though it is safe to set these posts 8 ft. from the face, that distance is often reduced where shortwall cutting machines are used, as this type of coal cutter requires less than 8 ft. of clearance. No room timbers are removed when a room is abandoned.

The roof on butt entries needs but little support, as the roads are driven only 9 ft. wide and are abandoned in less than a year. At some points where the roof may develop weakness, 20- or 40-lb. rails are placed across the entry to give it the needed support. In this manner rails are often used at the junction of two entries and at room-necks to avoid possible trouble from roof falls at such points. In every case, these rails are recovered when the places are abandoned. A rope from the drum of a crab locomotive is first made fast to the rail to be drawn. If necessary, a small stick of dynamite is used to dislodge a supporting timber. The locomotive, which is kept at a distance where it will be out of danger, is then used to pull out the rail.

As shown in the headpiece, it may happen that an exceptionally heavy fall of roof will make it necessary to place much lagging above the supporting rails. Need for

work of this kind has often occurred at entry junctions. In the figure mentioned, the roof fell and 30 mine-car loads had to be removed and the roof above it supported not only by steel but by lagging. To avoid this difficulty, these large open spans must be heavily supported by steel rails. This is but one of many practices adopted to reduce to a minimum the avoidable gobbing of roof material.

Other practices are supporting the necks of breakthroughs and crosscuts by three wooden posts and timbering all airways by setting posts staggered on 8-ft. centers. The extensive use of steel and wood for supporting the roof has greatly reduced the labor expense of clearing up and gobbing roof falls. Today, though the production of this mine is three times what it was four years ago, the expense for deadwork has been greatly decreased and less slate from falls is hauled out of the mine.

PROVIDING FOR GOOD HAULAGE AND VENTILATION

Referring again to the general plan of mining shown in Fig. 2, the practice has been followed of maintaining every third set of face entries for permanent haulage and ventilation. This set is maintained for an indefinite period depending on the life of the territory to be reached. The intermediate face entries are abandoned as the adjacent panels are finished. Likewise, every fifth set of butt entries is kept open sufficiently to facilitate haulage and ventilation as may be required. Though 60-lb. rails are laid on the main entries and 40-lb. rails on all face and butt entries, as previously stated, 20-lb. rails are used for the most part in rooms.

One of the measures taken to produce an output of 3,500 tons of coal per day is the double-tracking of primary haulage entries and of the more important of the secondary haulage roads. This practice includes the main entries and those face entries that are most commonly used. At present, the main entries have a length of $2\frac{1}{2}$ miles, which will be increased to 6 miles at some later time. The double-tracking of these entries now extends a distance of 6,600 ft. To expedite the work of gathering cars, sidetracks are provided on all face entries at the junction of butt entries. The expense of laying and maintaining these numerous sidetracks is

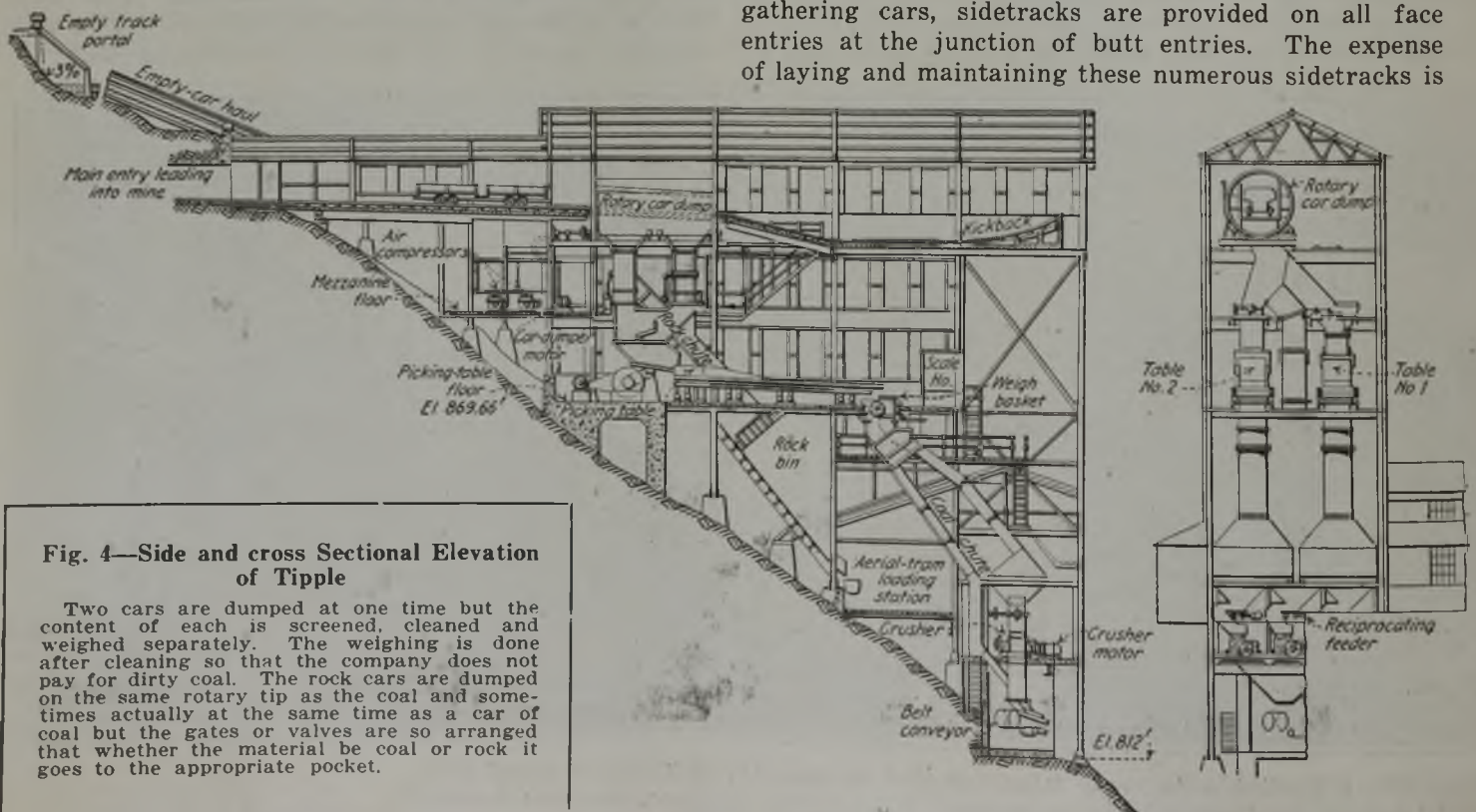


Fig. 4—Side and cross Sectional Elevation of Tipple

Two cars are dumped at one time but the content of each is screened, cleaned and weighed separately. The weighing is done after cleaning so that the company does not pay for dirty coal. The rock cars are dumped on the same rotary tip as the coal and sometimes actually at the same time as a car of coal but the gates or valves are so arranged that whether the material be coal or rock it goes to the appropriate pocket.



Fig. 5—Cars in Revolving Cradle Ready to Dump

The loaded cars come into the dump from what to the observer in this illustration appears as the rear. After dumping they run forward to the kickback and out to the inclined empty-car hoist on the right. The inclined track leading from the rotary dump must impart sufficient momentum to the two cars in tandem to enable them to negotiate the kickback and then clear the shunting switch on their way to one of the two car hauls.

offset by a reduction in the standing time of the gathering locomotives.

On the main haulage roads five 15-ton locomotives are in daily operation. The average one-way haul is 9,250 ft., and each locomotive makes eight round trips between the inby partings and the tippie each day. The estimated capacity of a 15-ton locomotive, running on a practically level track, is forty 2.4-ton cars, making a net load of 96 tons of coal per trip.

Based on an output of 3,500 tons of coal per day, each locomotive would be required to haul $3,500 \div (5 \times 8) = 87\frac{1}{2}$ tons of coal per trip, leaving a good margin for any rock that must be hauled out of the mine. Rated at its full capacity, each locomotive in operation is performing an average of $(96 \times 9,250) \div 5,280 =$ say 168 net ton-miles per hour in the hauling of coal and rock.

Each of the 850 cars with which this mine is equipped

makes an average of two trips a day, between the working face in the mine and the tippie. Estimating the output at 3,500 tons of coal per day and the cars as having a capacity of 2.4 tons, and making two trips a day, or hauling 4.8 tons of coal daily from the face to the tippie, the number of cars required to haul the coal would be $3,500 \div 4.8 =$ say 730 cars, which leaves a fair margin of facilities for the hauling of rock and for bad-order cars lying in the shop undergoing repairs and for others standing in idle places, or otherwise employed in the hauling of timber and track material.

CRAB LOCOMOTIVES USED ON GATHERING HAUL

For gathering haul, sixteen 6-ton and two 5-ton locomotives of the crab or reel type are used. This type of locomotive has been installed, because it is particularly adapted to gathering cars from rooms with the narrow necks that must be adopted at this mine if roof trouble is to be avoided and, again, because it avoids the necessity of a locomotive entering a room where the track is poor and derailment likely.

When a car is derailed by reason of defective track, it can be rerailed with far less difficulty than a locomotive. Each of the eighteen gathering locomotives hauls about 200 tons of coal per day from the working face to the sidetracks where trips are made up to be hauled out of the mine by the larger locomotives operating on the main road.

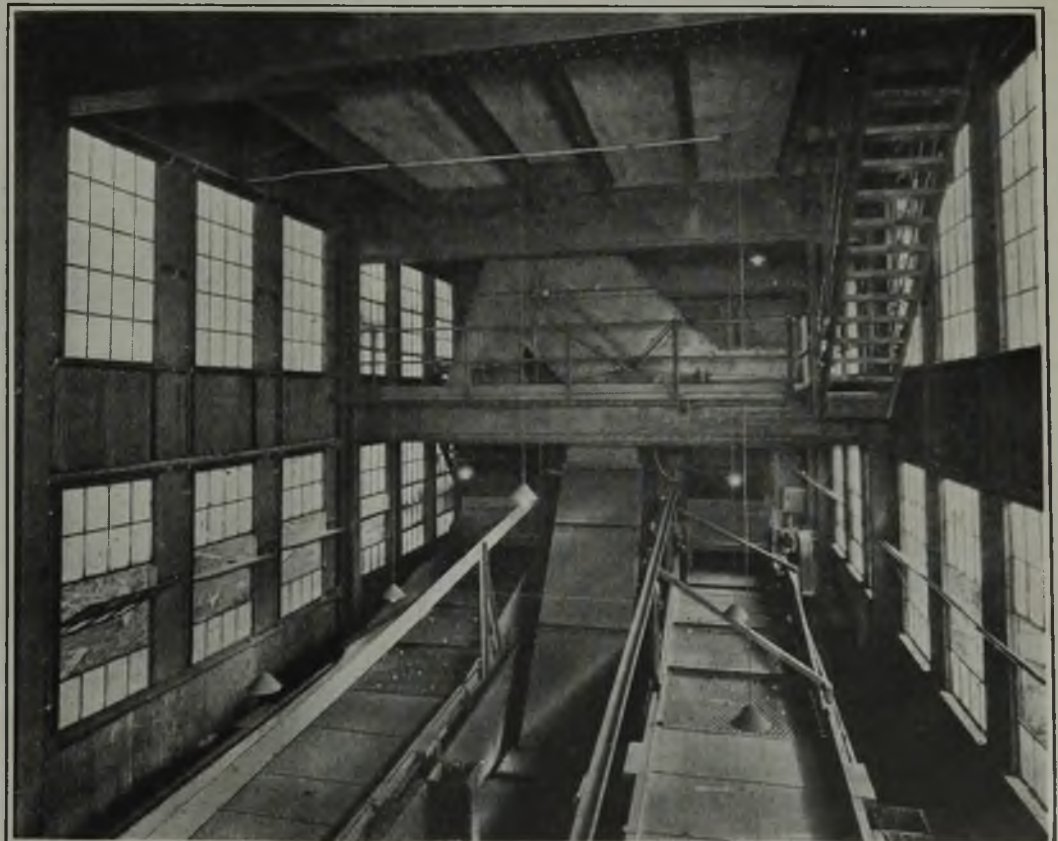
Mention has already been made of the efforts made to reduce the danger and minimize the expense caused by falls of roof on the roads. During the past year, 7,000 ft. of haulage road have been strengthened by building cribs and supporting the roof with heavy steel rails set in hitches cut in the ribs. Wherever a section of the roof on a main road gives increasing evidence of weakness, these rails are spaced 4 ft. apart.

The importance of this work is reflected largely by the increase during the year of the daily tonnage. In January, 1923, the average daily output was 1,300 tons. This was increased, in January of the present year to

FIG. 6

Shaking Screen Picking Tables

The coal dumped from each mine car passes over one of these two tables, and, in so passing the slack falls through the screen and the dirt is picked out by hand. The clean lump and the slack drop into a two-compartment weigh basket where they are weighed together. The aggregate weight of the two sizes is credited to the miner. Between the picking tables can be seen the chute which conveys the rock from the rotary dump to the rock bin.



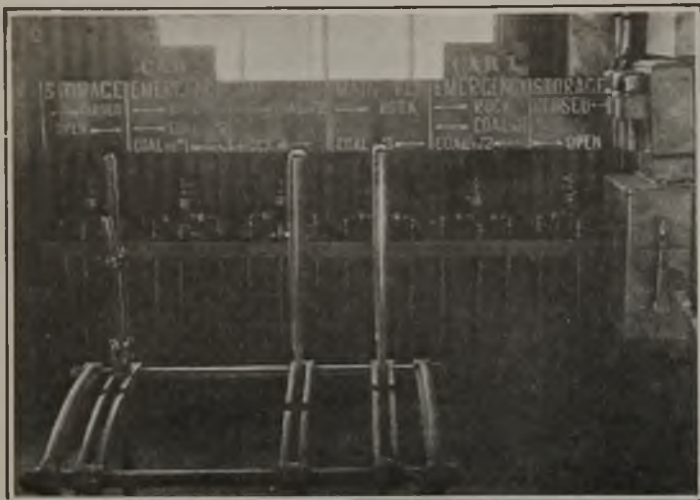


Fig. 7—Levers and Valves Controlling Dump

By regulating the valves shown behind the lever control, two mine cars both of coal or one each of rock and coal, are dumped simultaneously and the contents of each kept separate in its passage through the tippie.

2,636 tons daily, or more than 100 per cent. Naturally, there were other factors besides the protection of the roof on the road that contributed to these results, but timbering played an important part.

Of equal importance with the underground improvements that have been described was the construction and equipment of the new tippie building shown in Fig. 4. As appears in this figure, the mine has two openings, one for the loaded cars and another at a somewhat higher elevation for the empties. These are located on a steep hillside several hundred feet above the ground on which the power plant, previously mentioned, is erected. In order to overcome the disadvantage of handling the mine cars in freezing weather, ample storage trackroom, both for the empty and loaded cars was provided under the hill.

CARS ARE DUMPED IN PAIRS BY ELECTRICITY

The loaded cars coming out of the mine are run, in pairs, into an electrically driven two-car rotary dump shown in Fig. 5 which gives a view of a portion of the tippie floor and the arrangement of the tracks leading from the dump to the kickback and returning through the switch to the empty-car hauls. In the background beyond the rotary dump are shown the loaded cars coming from the mine, and on the right is shown the lower portion of the empty-car hauls. Leaving the dump the empty cars run down a short, steep incline to a two-car kickback, returning from which they are shunted to either one of the two empty-car hauls, by which they are taken to a higher elevation so that they will run by gravity into the mine.

The two-car kickback is a feature found at few mines. Its design requires special care to obtain the right vertical curves that will handle two mine cars in tandem and impart to them sufficient momentum to enable both cars to clear the switch leading to the empty-car haul. In order to avoid delay caused by a breakdown of the machinery, this car-haul was installed in duplicate, one unit always being held in reserve to be used in case of accident to the other.

On loaded tracks the inclination of a plane is usually limited to 14 deg., so as to prevent coal from falling off the cars on the incline. This haul, however, was for empty cars only, so it was given an inclination of 23 deg. In consequence it is possible to gain the required elevation in the short distance available between the

switch at the kickback and the head of the graded track leading into the mine.

The tippie is of steel and covered with corrugated iron siding. A novel feature of the two-car rotary dump is the provision made to enable each car when loaded with coal to deliver its load to individual shaker screens and picking tables, each of which has a capacity of 250 tons per hour. By an ingenious arrangement of pockets, chutes and air-control fly gates, a car loaded with rock whether occupying the forward or the rear position on the dump, can be made to empty its load into a 70-ton reinforced concrete hopper, from which the rock is conveyed away by buckets on an aerial tram, as shown in the panorama.

SHAKING SCREENS AND PICKING TABLES

When coal is dumped from the cars, it is carried by chutes to two double-deck shaker screens, which effect the separation of sizes under 1½ in., the larger sizes remaining on the upper deck of the screen, the smaller sizes and slack falling through to the lower deck. From the screen, the lump coal passes onto picking tables where the refuse is picked from the coal and thrown into openings leading to rock chutes on each side of the picking tables.

In Fig. 6, is shown a photographic view of the shaker screens and picking tables with their side pockets, as taken from a point near the scale house. A comparison of this view with the arrangement shown in Fig. 4 will afford a clear understanding of the equipment. Between the two shaking tables appear the rock chutes conveying slate and other refuse to the rock bin below. In the upper right portion of the illustration appears the stairway leading down from the tippie floor. This enables the tippie force to inspect and operate the air-compressor system controlling the wings and gates in the chutes. The head of this stairway is shown on the right of the view of the tippie floor (Fig. 5).

Both the lump coal from the upper deck and the screenings from the lower deck of the shaker screen are conveyed to a double compartment weigh basket, the lump coal having first passed over the picking tables, for the removal of any refuse or rock it may contain. This arrangement is designed to facilitate the weighing at one and the same time of all the coal from individual



Fig. 8—Automatic Recording Scale

Not only is the miner satisfied that the dirt for which he is docked actually was in his coal but he is made certain that the record of weight is correct as vouched for by the recording scale which makes a permanent statement of the weights taken against which can be affixed the numbers on the miners' checks as deposited in the slot provided for that purpose.

mine cars after the refuse has been picked from the lump coal as described.

As will appear from a study of the elevation of the tipple in Fig. 4, a duplicate cycle of operations is provided. The load in each mine car is weighed and dumped before the load of the next car is deposited in the basket for weighing. The two separate sizes are weighed jointly through the agency of automatic recording scales.

AIR CONTROL DUMPS ROCK AND COAL TOGETHER

The dumping of coal and rock at the same time and from the same two-car rotary dump is made possible by a system of control levers and air valves located in an operating room, as shown in Fig. 7. Behind the car-dump levers appear the 3-way air-control valves just below the boards on which are indicated the various directions in which the valves should be turned so as to dump rock and coal from cars Nos. 1 and 2 standing on the rotary dump.

In Fig. 8 is shown a view of the scale house containing the automatic recording device for the weighing of the coal contained in the double compartment weigh basket previously mentioned. After weighing, the coal is dumped from the basket into a bin or hopper from which it is fed by reciprocating feeders to any two of three crushers (see Fig. 4), each having a capacity of

125 tons per hour. Here also, in order to avoid possible delays from breakdowns, a spare crusher unit is provided and held in reserve in case any one of the two crushers may be out of commission.

From the crushers the lump coal is fed to a 30-in. belt conveyor where it is joined with the fine coal and slack which has bypassed the crushers. The entire product is now carried by a series of conveyors that link the tipple with the storage yard at the bottom of the hill and with the power plant adjoining the yard. Provision is also made for delivering coal to the river, if desired, as indicated in the panoramic view previously shown.

A point not to be overlooked in the operation of the mine is the equity afforded all parties by the elimination of tare weight, which has always been the cause of much friction between operators and miners. By screening and picking the coal in mine-car lots before it is weighed, the miner is assured that he will be credited for the exact quantity of clean coal contained in his car. The system offers excellent opportunity for the inspection of the contents of every car of coal coming from the mine. At many operations the inspector has no adequate means of making a satisfactory determination of the quantity of dirty coal in the mine car and this is a cause of a great deal of dissatisfaction.

The Miner's Torch

A Library for Sale

THERE has been much discussion of late in the engineering press and in society proceedings covering the changed status of the engineer in the mining industry. Year by year the mechanical requirements of our mines have increased, and during the last half dozen years this increase has been almost staggering, especially at our coal mines. With the increased use of machinery, mine management and mine planning become more complex and engineering ability becomes more and more a necessity. But it does not follow that because the percentage of engineers at our mining camps is increasing that engineers as a rule are being offered the encouragement that their present importance would seem to justify.

Bearing on the above I want to record an adventure that befel me in a second-hand book store not very long ago.

I had often visited the particular shop and occasionally made purchases, not technical books, however; in fact I had never seen a technical book of any description on any of the shelves or racks. Generally I was drawn to the place when I felt a desire to get away from things technical. On the day in question, as I entered the shop the first thing that attracted my attention was a dozen or so books bound in the sort of bindings that one instinctively associates with books dealing with things technical. My first impulse was to make a hurried exit but this was followed by a desire to find out whether there was a story connected with the offer to sell; why did the man who owned them decide to dispose of them?

You are expecting an engineer's hard luck story just as I did but it is not the kind of a hard luck story that you nor I anticipated. These books were the property of an ex-professor of mining engineering who had given up his profession in disgust and accepted employment as a mechanical engineer with a large manufacturing company; having fully decided that he would never again have any interest in the mining industry, he decided to dispose of his mining library for what it would bring.

I guessed most of the story when I opened the first book and saw his name on the fly leaf, because some three or four years previously I had met the man at a gathering of mining men and he was complaining bitterly at that time about the treatment accorded his graduates by the men who employed them. He intimated then that he felt called upon at times to advise the undergraduates in his department to make a change before it was too late. The owner of the book shop was able to give me the balance of the story, as he had talked to the ex-professor when he came in to dispose of the books.

Many will assume that the professor was not fitted for his task, but I have known several of his students and their estimate of him would not bear out that assumption.

If, in spite of the growing demand for mining engineers, a professor of mining engineering can't conscientiously advise young men to enter the profession, and feels called upon himself to give up teaching, it would seem that a fuller discussion of the subject should be welcomed.

COAL AGE INDEX—A few indexes of *Coal Age* for the last half of 1923 remain. Should you have use for such an index kindly write to *Coal Age* for a copy, which until the present supply is exhausted will be sent free to those desiring it.

Safety Earns Men Four Times As Much as Company

U. S. Coal & Coke Co. Prevents Its Employees from Losing by Accident \$100,000 a Year—Maintains Interest by Bonuses to Bosses

THAT ample room remained at coal mines for improvement in accident prevention was indicated conclusively by Howard N. Eavenson, in an address on "Mine Accident Prevention from the Standpoint of the Mine Operator," before the Mine Safety Conference in Pittsburgh. In reviewing the experiences of the U. S. Coal & Coke Co. in its mines at Gary, W. Va., he stated that during a period of ten years following the adoption in 1909 of the slogan, "Safety the First Consideration," the prevention of accidents saved the company 39 per cent of the compensation it would have had to have paid had the accident rate not been reduced.

Still more striking was the saving to employees during this time, it being equal to the wages earned which otherwise would have been lost had the accident rate existing prior to 1909 been maintained. This saving now amounts to more than \$1,000,000, or an average of slightly over \$100,000 per year. In other words, for every dollar the company saves for itself through accident prevention, it saves \$4.55 for its employees through the elimination of idle periods due to accidents. As time goes on the saving to employees will increase as the number of prevented accidents grows.

These savings were made in a group of eleven mines. They normally produce from 3,000,000 to 5,000,000 tons of coal per year. The roof over one of the beds is a drawslate with many pot holes. Above the other seam, the roof consists of laminated slate and coal.

The first step taken toward the prevention of accidents was the division of each mine into small sections, each of which was placed under the supervision of an assistant mine foreman. The section is of such size

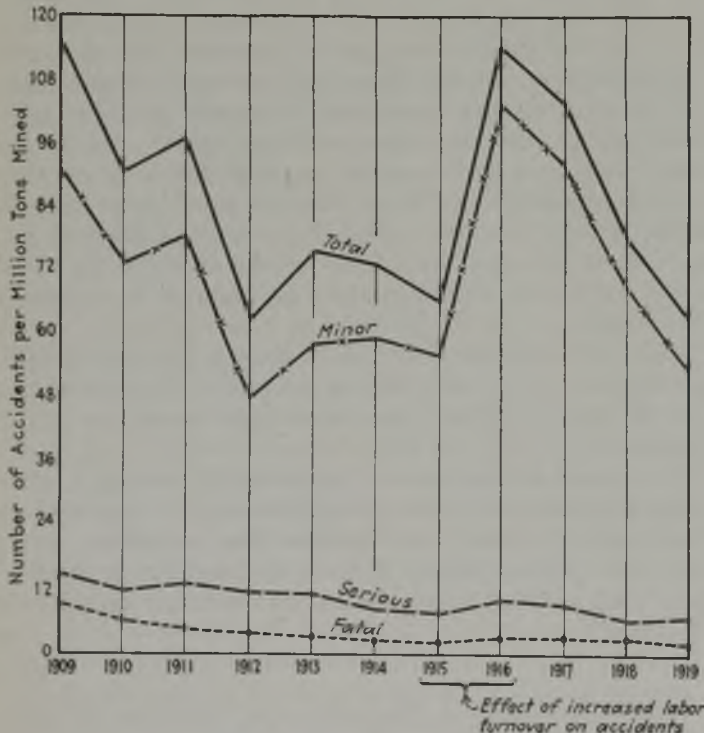


Fig. 1—Training and Education in Accident Prevention

This clearly shows the effect of high labor turnover during the years 1915 and 1916. Its effect is most evident in the minor accidents. It is less pronounced in the serious and fatal mishaps although its influence is visible even there.

CAUSE	INSIDE	NO.	OUTSIDE	NO.	TOTAL	NO.
Defective Machinery Lack of Guards Poor Equipment etc.	<input type="checkbox"/> 4%	8	<input type="checkbox"/> 10%	6	<input type="checkbox"/> 6%	14
Carelessness of injured	61% <input type="checkbox"/> 113		62% <input type="checkbox"/> 37		62% <input type="checkbox"/> 150	
Carelessness of others	<input type="checkbox"/> 9%	16	<input type="checkbox"/> 15%	9	<input type="checkbox"/> 10%	25
Violation of Rules by Bosses	<input type="checkbox"/> 8%	15			<input type="checkbox"/> 6%	15
Disobedience of instructions by injured	<input type="checkbox"/> 14%	26	<input type="checkbox"/> 7%	4	<input type="checkbox"/> 12%	30
Disobedience of Company Rules	<input type="checkbox"/> 1%	2	<input type="checkbox"/> 1%	1	<input type="checkbox"/> 1%	3
Unavoidable by injured	<input type="checkbox"/> 3%	5	<input type="checkbox"/> 5%	3	<input type="checkbox"/> 3%	8
Total						245

Fig. 2—Classification of Lost Time Accidents in 1919

Only 3 per cent of total accidents are here classified as unavoidable or pure accidents. Six per cent of the accidents occurring arose from defective machinery. This leaves a total of 91 per cent of accidents caused by carelessness or disobedience of rules or instructions. This represents by far the major field for possible improvement.

that the assistant foreman in charge can visit every working place in it at least once every two hours; no more than 40 men are under his care. He must examine all working places before the men enter them; he does the shooting himself and sees to the safety of his men by prohibiting unsafe practices. He is also instructed to stay on the spot until any dangerous conditions discovered are remedied.

A bonus system based on a sliding scale rewards those assistant foremen who have clean records for specified periods of time. For one month without accident a foreman receives \$5. If he sustains such a record for six or more consecutive months he receives \$15 extra for each month during the period free of accidents. He is given demerits for accidents occurring in his section, but these can be erased from his account, that is, neutralized or counterbalanced by an exceptionally good subsequent record.

This system of intensive supervision has made these mines so safe that the number of fatalities occurring in them is one-fifth the number that occurred prior to 1909. On a tonnage basis, the rate or liability to accident is one-half that for West Virginia as a whole. In Fig. 1 is shown a chart which sets forth the character and extent of accidents from 1909 to 1919.

Labor turnover in these mines is large, and was notably so in 1915 and 1916. This militates against the efforts of the company in the prevention of accidents. Of the miners employed 50 per cent are foreigners, 25 per cent are natives of the region and 25 per cent are native Americans but not of the region.

Lost-time accidents during 1919 are classified in Fig. 2. The purpose of the study which preceded the making of this classification was to ascertain how accidents occurred, particularly as to whether they were due to the carelessness of the men injured or that of others. Fig. 2 shows that unavoidable accidents make up only 3 per cent, and defective machinery is responsible for only 6 per cent of the total number of accidents. The remaining 91 per cent represents a wide margin for possible improvement, all of these being caused by carelessness on the part of either the injured persons or others.

Can Signals Be Transmitted from Mine to Surface And Vice Versa by Ground Conduction System?

Transmitting and Receiving Apparatus Should Be Designed to Resist Adverse Mine Conditions—Importance of Foolproof Equipment—Signals are Most Effectually Transmitted Through Ground That is Neither Dry Nor Too Moist

By J. J. JAKOSKY*

FOR some time the U. S. Bureau of Mines has been studying underground communication, particularly through rock, ore, and coal, preliminary radio tests being made during the summer of 1922.

The experiments, though they did not indicate any practical method of using wireless waves for underground communications, nevertheless proved clearly that electromagnetic waves may be made to travel through solid strata. The absorption, or loss of intensity with distance, is great for short wave lengths. Long wave lengths are known to suffer less absorption and under certain conditions possibly may be found effective.

The experiments with the geophone were completed two years ago. It is one of the simplest and most portable of signal apparatus. For mine-rescue work, however, it has two major limitations—namely, (1) communication or exchange of information is impossible, except where a predetermined set of signals has been arranged; and (2) extraneous noises such as made by rescue operations, wind, surface, mine vibrations, and such like, limit the use of the apparatus for picking up weak signals. Only a comparatively few prearranged signals may be used for the geophone, because their transmission must necessarily be slow, due to the method by which they are sent, one common method being pounding on the mine walls with heavy rocks or sledges. Variable time lengths such as have proved so effective in telegraphy cannot be used in the transmittal of signals by the geophone.

SIGNAL APPARATUS SET AT STRATEGIC POINTS

The purpose of the work on underground communication is mainly to devise a reliable means of communication for underground use. Should a practical system be devised, it may be advisable as a safety and mine-rescue aid to place such signal apparatus, together with other emergency equipment, at convenient strategic points, such as the faces of entries, on different levels, etc., within the mine where men might be trapped by mine explosions, fires, falls of rock, or other disasters. A study would have to be made of each individual mine, taking into consideration the ventilation, entries and drifts, position of mine, barricading facilities, adjacent workings, present and future mining operations and so forth.

The Bureau of Mines has advocated that refuge chambers be built in the main sections of mines. After an explosion or during a mine fire men might retreat to these chambers and close themselves in until help arrived. Such chambers should be provided with drinking water, canned food and compressed air. In some coal mines in the United States where many explosions

have occurred during shotfiring time small refuge chambers have been provided, and these chambers have saved lives. A practical form of communicating apparatus also placed in the chamber would probably be of great help to rescue parties.

Although somewhat costly in initial installation and maintenance, the present mine telephone is giving satisfaction in most mines. In cases of disaster, such as explosions, fires, falls of rock, flooding, etc., the telephone is often put out of commission or cannot be reached by the underground workers, and that at the time when it is most urgently needed. For this reason the mining industry as a whole is interested in any system of communication—"phone" in preference to code—that can be relied upon in an emergency and many requests have been received to devise such a system.

The solution of the entire mine communication problem is dependent mainly upon the working out of a practical portable mine apparatus of sufficient sensitivity to receive and of an adequate power to transmit over an effective range. It is well known that signals can be transmitted considerable distances through the earth if enough power and a receiving set of sufficient sensitivity be used.

Requirements of mine-rescue radio—The ideal system for mine rescue work and general underground communication would be one where voice transmission and reception is possible. The transmission of code cannot be considered as a general solution to the problem of underground communication. Code however, as regards

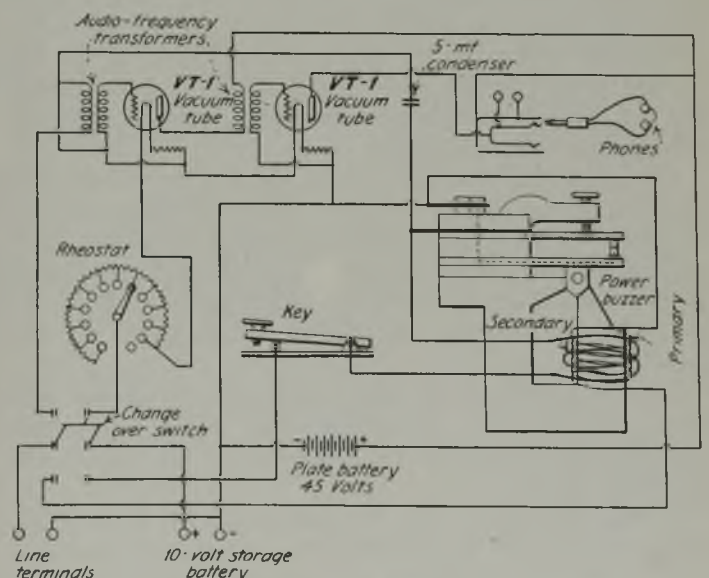


Fig. 1—Transmitting and Receiving Circuits of Tested Signal Outfit

This set consists of the complete equipment necessary for sending or receiving signals. Dots and dashes are propagated through the earth by means of current impulses set up by a power buzzer. Reception is similar to radio detection except that the signals are "picked up" from ground currents set up by the transmitting station.

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Transmission of information, has advantages over the geophone.

To be of practical value any type of apparatus for underground communication must be simple in operation. If high frequencies are employed, requiring tuning to produce resonance, some few fixed frequencies should be used. Two or more different frequencies will allow simultaneous communication by either radio or wired radio during general mining operations. For

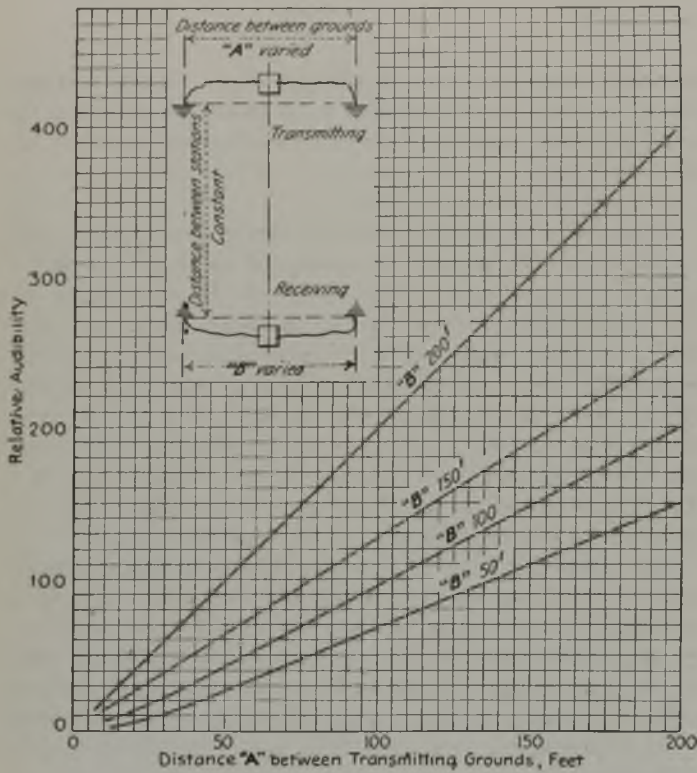


Fig. 2—Signals Become More Audible as Distance Between Ground Connections Is Increased

The ground currents set up through the earth spread out in the shape of a sphere when sent from the mine. Hence the greater the distance, within reasonable limits, between the ground connections of either the sending or receiving circuits the louder the signals become.

mine-rescue work during disasters it now seems probable that only one definite frequency should be used.

Vacuum tubes are the only practical method for the successful modulation and transmission of voice signals, but for the transmission of code signals many different instruments can be used.

The apparatus will have to be such as it will be safe to use in an atmosphere containing an explosive mixture of gases. During mine disasters, and especially when barricades are erected, a gas explosion is to be apprehended should unsafe electrical apparatus be used. All mine-signal apparatus should be of an approved and permissible type.

For satisfactory and practicable use in mining and rescue operations, an underground signal apparatus probably would have to be designed to incorporate the following points.

1. The apparatus must be moisture and waterproof, that is, it should be unaffected by dampness and continuous standing in wet mines. Practically none of the radio or high-frequency apparatus being sold today for general amateur and broadcast use would be suitable for such work.

The condensation of moisture on the surface of dielectric and non-waterproofed insulating materials, unprotected windings, condenser end-plates, etc., causes

large current leakages. In numerous tests radio, as well as other high-frequency signal, apparatus left underground 2 to 10 hr. became very inefficient.

2. The apparatus must be durable, rugged, and fool-proof. The entire equipment should be inclosed in a strong case and all delicate apparatus such as vacuum tubes, controller knobs, etc., should be protected.

3. If the mine apparatus is to be of practical use it must be easy to maintain in good working order. The apparatus itself must not depreciate and the efficiency of the A and B battery power supply must be maintained. If batteries are used as a source of power they should be inspected regularly. If storage cells are to be used, a suitable number of the 8-amp.-hr. miners' cap-lamp batteries would give satisfactory service. In special cases dry cells may be used. Present tests indicate that a properly designed hand-cranked generator, designed to supply a 6-volt filament current and a 250-volt plate current and provided with a suitable filtering system, will prove satisfactory for underground transmission and reception.

4. The receiving apparatus should be simple to operate and probably should be very sensitive, for in practically all types of underground communication, whether by direct ground, induction currents, radio, and to a much less extent line-radio, much of the energy is absorbed.

WEIGHT AND SHAPE ARE MOST IMPORTANT FACTORS

5. The last and probably the most important point to be considered is the weight and shape of the signal apparatus. The equipment should be light or it will not be sufficiently portable for underground use. It is possible that a satisfactory arrangement may be designed so that the transmitting and receiving apparatus can be placed in one cabinet, and the power supply, whether batteries or hand-cranked generator, can be carried in another. A suitable non-reversible plug, safe in atmospheres containing explosive mixtures of methane and air could be used for connecting the power supply to the apparatus when in use. The general shape of case and carrying straps or handles must be such as to allow the apparatus to be readily moved while underground should it be necessary to crawl or keep one hand free.

Methods being Investigated—The present investigation being conducted includes the (1) T.P.S. or ground-conduction methods; (2) induction signaling with both high and low frequencies; (3) line-radio over underground mine power and telephone lines, trolley wires, rails, and through piping for water and compressed air; (4) radio; and (5) electrical geophones and auxiliary equipment. These investigations include studies of the effects of earth falls, mine floods, and similar conditions encountered during disaster, as well as general underground conditions existing in the ordinary operations of metal and coal mines.

UNDERGROUND CONDITIONS MAY DETERMINE TYPE

A practical type of apparatus to be of use to the mining industry should be capable of operating over distances of from 500 to 3,000 ft. or more underground through different strata—coal, orebodies, etc. It is probable that apparatus suitable for one geologic condition may not be so satisfactory for another.

The ground conduction system—Because of its simplicity, and also to facilitate obtaining certain fundamental data regarding underground transmission, the T.P.S. set used and developed by the Signal Corps of the

U. S. Army was first subjected to experimental test. This report is the first of a series dealing with electrical methods of underground communication and signaling, and is confined solely to the results obtained with the T.P.S. set.

The T.P.S. method, or ground telegraphy, is a means of communication which requires no wire connection between the sending and receiving stations. It differs from radio telegraphy in that the transfer of electrical energy from the transmitting to the receiving apparatus is through the ground and more by conduction than by induction, whereas with radio the transmission is through the air. The current generated by the transmitting apparatus is a variable alternating current of comparatively low frequency, such as 0.5 to 1.8 kilocycles per second, instead of the high-frequency oscillations of 100 to 3,000 kilocycles per second, which are commonly employed for radio communication.

Description of apparatus used—The apparatus used in these investigations consisted of the standard U. S. Army Signal Corps T.P.S. set, box type BC 21, weighing 40 lb. The transmitting set consists of a power buzzer or buzzer transformer which generates a high-voltage audio-frequency alternating or variable electromotive force of unsymmetrical form; a storage battery for supplying power to the primary circuit of the power transformer and the filament of the receiving tubes; a telegraphic key for interrupting the power supply in order to transmit code signals; and the necessary ground equipment consisting of ground stakes, field wire, etc.

The power buzzer or transformer, shown in the diagram of connections in Fig. 1, is practically the same as the old French T.P.S. buzzer set. The transformer consists of a laminated rectangular iron core of special shape with two windings—primary and secondary. Connected in series with the primary winding of the transformer is the power supply, a telegraphic sending key and an interrupter vibrator of special design. When the sending key is depressed, the primary circuit is closed, and the current flow in the primary coil magnetizes the core and draws the vibrator downward.

The circuit is then broken at the vibrator contacts, and the magnetic field decays, the vibrator again returning to its first position, the action being analogous to the familiar induction coil used for ignition in many automobiles and gas engines. A pulsating current is thus made to flow in the primary circuit. The secondary high-voltage winding of the transformer is wound directly over the primary. The pulsating direct current flowing in the primary winding induces a high-voltage variable electromotive force in the secondary winding which, when the secondary circuit is closed, causes a variable alternating current of the same frequency to flow in the secondary or ground circuit.

T.P.S. SYSTEM FOR TELEGRAPHIC SIGNALS

By properly opening and closing the key telegraphic signals may be transmitted. The T.P.S. method of signaling is for telegraphy only and cannot be used for voice or speech transmission. The frequency of the pulsating current depends upon the adjustment of the vibrator and may be varied between frequencies of approximately 500 to 1,500 cycles per second by means of a set of small weights fastened, singly or in pairs, to the vibrator armature.

The magnetic circuit of the power transformer is a closed iron core, except for a V-shaped air-gap between

the iron core and the iron armature attached to the vibrator. This is shown schematically in Fig. 1. A 6-microfarad condenser is shunted across the vibrator contacts to reduce sparking and to give a greater time rate of change of primary current at the instant the circuit is broken by the vibrator.

A switch is provided for changing over from transmitting to receiving. On the receiving position the switch disconnects the transmitting power supply and

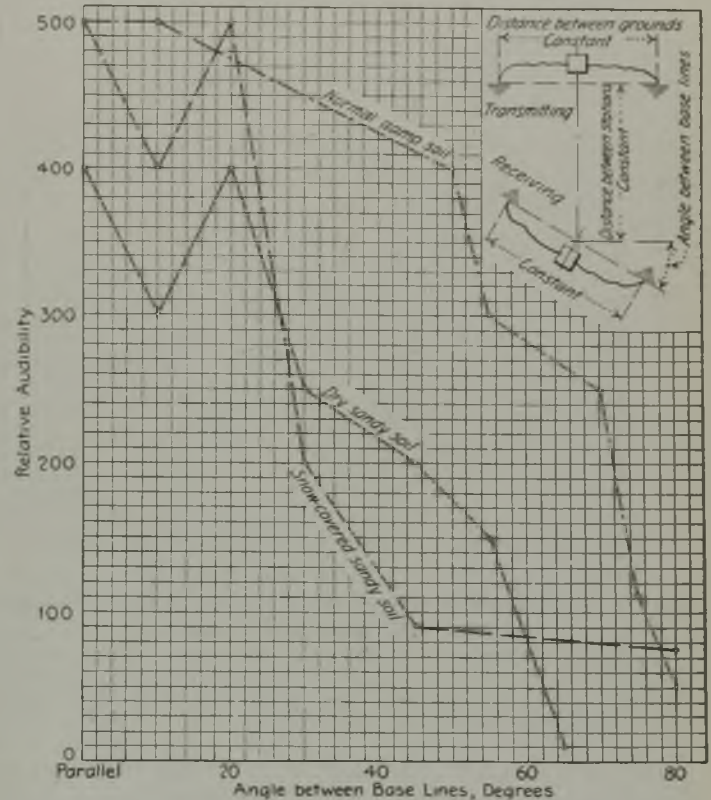


Fig. 3—Signal Strength Decreases When Ground Connections of Outfits Are Not Parallel

Regardless of the conductivity of the soil the relative audibility of the signals decreases as the angle between the base lines of the sending and receiving sets is increased. Normal damp soil permits an easy flow of current into the earth; loose, dry, sandy soil offers high resistance; whereas snow-covered soil short-circuits the two ground connections of the sending outfit and the earth currents fail to penetrate to any practical degree.

the secondary of the transformer from the ground wires, and connects the primary of the first audio-frequency amplifying transformer directly across the ground terminals. On the transmitting position the receiving apparatus is disconnected from the ground terminals and the filament circuit of the tubes opened.

The receiving equipment is practically the same as the ordinary two-step transformer-coupled cascade amplifier used for audio-frequency amplification in radio telephone and telegraphic work. The cascaded method consists of a series of amplifying tubes arranged electrically so that the amplified output of each tube is received by the next tube, where still further amplification takes place. Each tube with its auxiliary coupling apparatus is called a stage or step of amplification.

The secondary of the first transformer is connected between the filament and grid of the first vacuum tube. The plate circuit of this tube is connected in series with the primary of the second transformer, which couples the grid circuit of the second tube. The phones are placed in the plate circuit of the second tube. A 45-volt B battery furnishes the plate voltage for the tubes. The filaments of the two vacuum tubes are connected in series with a rheostat for regulating filament current.

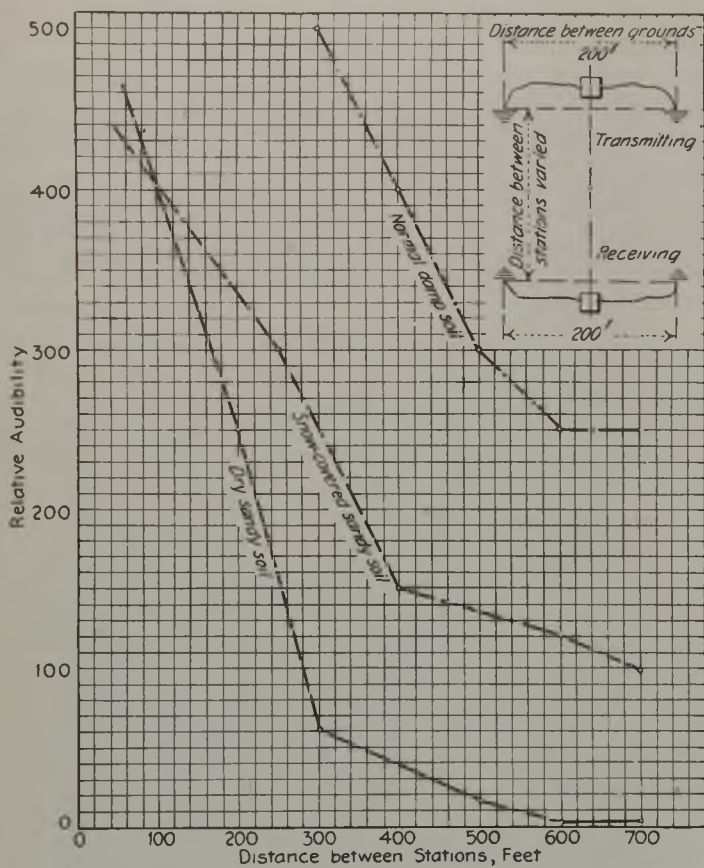


Fig. 4—Regardless of the Kind of Earth, Signals Become Fainter with Increased Distance

At short distances from the transmitting station the audibility was high but rapidly became lower as the distance was increased. It will be noticed from the curves that the rapid decrease in audibility was not uniform; there was a point on each curve where the signals faded out slowly.

The principle of operation of the T.P.S. method of signaling is very simple. The secondary terminals of the power buzzer are each connected to an insulated ground wire connected to the ground. The two ground terminals are placed from 50 to 1,000 ft. apart, the distance depending upon the communicating distance and the local topographic and geologic conditions. The high-voltage secondary current from the transformer flows through the ground wire to its grounded end, through the earth to the grounded end of the other ground wire and back to the transformer.

The current flowing between the two ground terminals does not confine itself to the straight line connecting the two terminals, but spreads out somewhat in the form of a sphere when the terminals are at a sufficient distance underground; and somewhat in the form of a hemisphere when the terminals are placed on the surface of the earth. The distribution of current about the line joining the two ground terminals depends largely upon the relative conductivity of the different strata and earths between the terminals.

The lower the resistance the greater the current flow through that particular strata or conducting strip. Advantage is taken of this fact in order to pick up the currents. For receiving T.P.S. signals, two ground terminals, similar to those used in transmitting, are connected by means of low resistance insulated wires to the input of the receiving apparatus. The current flow through the ground in the vicinity of the receiving station, flows through the circuit composed of the ground leads and the receiving set.

If it is desired to both send and receive at a station, the same ground terminals are used and a change over switch used for connecting either the transmitting or

receiving apparatus to the ground terminals. For ordinary use, where communicating distances from 500 to 1,000 ft. are to be covered, the ground connections should be not less than 100 to 200 ft. apart, and a sensitive two-step audio-frequency amplifier used for receiving.

For reliable underground communication it has been found that this method of signaling is effective only for a distance equal to from two to four times that at which the ground terminals are placed. If, for instance, the terminals at each station are placed 200 ft. apart and the lines joining them are approximately parallel, signals can be reliably transmitted a distance of from 400 to 800 ft. In many cases this range is greatly exceeded, depending on local topographic conditions and on the degree with which leakage and induction currents from power and trolley wires in the mine and on the surface interfere with transmission of the signaling current.

NON-CONDUCTING EARTH PREVENTS PENETRATION

Factors affecting transmission of signals—In the horizontal transmission of signals along the surface of the earth natural surface conditions affect the range considerably. A stratum of non-conducting earth immediately below the transmitting set will prevent the current from passing to any great depth and usually will force it to spread out horizontally to fairly considerable distances. A very dry earth surface, being of high resistance, or a high-resistant connection at the ground terminals will permit only a weak current to flow between the terminals, and usually reduces considerably the distance over which communication is possible.

On the other hand, a very wet surface usually provides too good a conductor, and permits practically all the current to flow directly between the ground connections without spreading out. If a transmitting set is placed close to a river or other place where the subsoil is very wet, the range of the apparatus will usually be less. Conductors buried in the earth or in contact with and lying on the surface, such as metallic piping for water, compressed air, drainage, and sewage, railroad tracks, etc., also greatly reduce the transmitting range of the set, and care must be taken that the ground terminals are placed as far as possible from such metallic conductors, which short-circuit the ground return currents and prevent their spreading or penetration. Under suitable geologic conditions the lines by which current flows between the grounds may spread out as far as two or possibly even three miles from the sending station.

As a preliminary study in the use of T.P.S. sets, the characteristics of the sets for horizontal transmission along the surface of the ground were first determined, and the curves indicate some of these characteristics. Tests were made in different localities, and although the general curves cannot be locally applied quantitatively, they are of value in indicating the general characteristics of the set.

SNOW AND RAINS REDUCE RANGE OF SIGNALS

For any given installation, the signal range varies with local rains, surface and drainage, etc. As a rule, small showers, after a short interval to allow surface drainage, do not appreciably affect the range; but during heavy rains or when the snow is melting there is usually a marked decrease in the range of transmission. The latter factor has, however, not always been

found to hold true when the two ground connections are placed on the opposite sides of a water shed, such as when the T.P.S. set is placed on the ridge of a hill and the two ground leads extended outward a sufficient distance on opposite slopes of the ridge.

The curves in Fig. 2 were obtained by varying the distance between both the transmitting and the receiving ground terminals and keeping parallel the two base lines of the transmitting and receiving sets with the distance between stations constant. For these tests two-step audio-frequency amplifiers were used, with an audibility meter shunted across the phones. The curves indicate that the transmission and receiving ranges of the set vary almost directly with the distance between their respective ground terminals. The greater the distance between terminals the greater the range.

When the sets are used underground, an effort should be made to make the distance between terminals as great as possible. Should it be necessary to place the grounds in an entry or drift containing car tracks, compressed-air piping, or other conductors, maximum range will usually be obtained only if special care be taken to keep the ground terminals as far as possible from such conductors.

In Fig. 3 is given the relationship between the audibility of the received signals and the angles between the base lines of the two sets. It will be noted that for the most audible signals the two base lines should be parallel. As the angle between base lines approaches a right angle, the signal strength or audibility decreases abruptly, although the audibility varies considerably with surface conditions. Even at right angles, however, the signal strength did not drop to zero.

In Fig. 4 is shown the relationship of the distance between stations and the audibility of the receiving signals. The stations were placed with their base lines parallel, and both receiving and transmitting ground terminals were kept 200 ft. apart. It will be noted that the audibility drops off rapidly with the first few hundred feet, but after that it decreases slowly with the increased distance between stations. At distances around 1,000 ft. good readable signals were obtained.

Transmission along mine tracks—Compressed-air piping, car rails, or other conductors may be used as a carrier for T.P.S. signals. Little difficulty was experienced in transmitting signals over such conductors in any part of the Bureau's experimental mine. The decrease in relative audibility of signals with the distance between stations is similar to that for transmission on the surface, shown in Fig. 4. In this series of tests the tracks were, in a number of places, covered with mud and water, and were laid directly upon the mine floor. In two places 8-in. wooden rails had been inserted as a protection against lightning, but the T.P.S. current penetrated the wooden rails—which were wet—without any great decrease in audibility.

In order to determine the effects of mine cars upon the track, a mule was hitched to two pit-cars and a truck. The transmitting set was at the rear of the mine, about 1,200 ft. from the entry where the receiving set was placed. The curve in Fig. 5 indicates the relative audibility of the received signals as the mine cars were moved from the entry toward the interior of the mine. It is interesting to note that the audibility is low when the mine cars are near either the transmitting or receiving sets, but as the distance between the transmitting or receiving set and the cars is increased, the audibility rises considerably. The effects

of short-circuits upon tracks are particularly noticeable in rail radio.

Similar tests were made at the Pittsburgh Terminal Coal Co. Mine No. 3 and the mine of the Inland Collieries, Inc. In the first mine an unused portion of track with 20-lb. rails which was covered with heavy roof falls, mud and water nearly its entire length was used during one test. The rail joints were broken in many places and heavy rust covered all metal joints; fishplates, switches, etc. This series of tests indicated clearly the carrying power of T.P.S. signals over poor conductors running through water, coal and mud covering.

Additional tests at the Inland Collieries, Inc., mine are of particular interest, and illustrate a rather peculiar phenomenon. These tests were conducted on one of the main haulageways. Thirty-pound rails are used, all joints securely copper bonded and the rails cross-bonded every 150 ft. with heavy copper leads. The transmitting set was connected to the rails at the point where one of the cross-bonds connected or short-circuited the two rails.

The receiving set was mounted upon a storage-battery locomotive and two short leads with spring clips used for making contact with the rails. Signals could be read at distances from the transmitting set 1,900 ft.

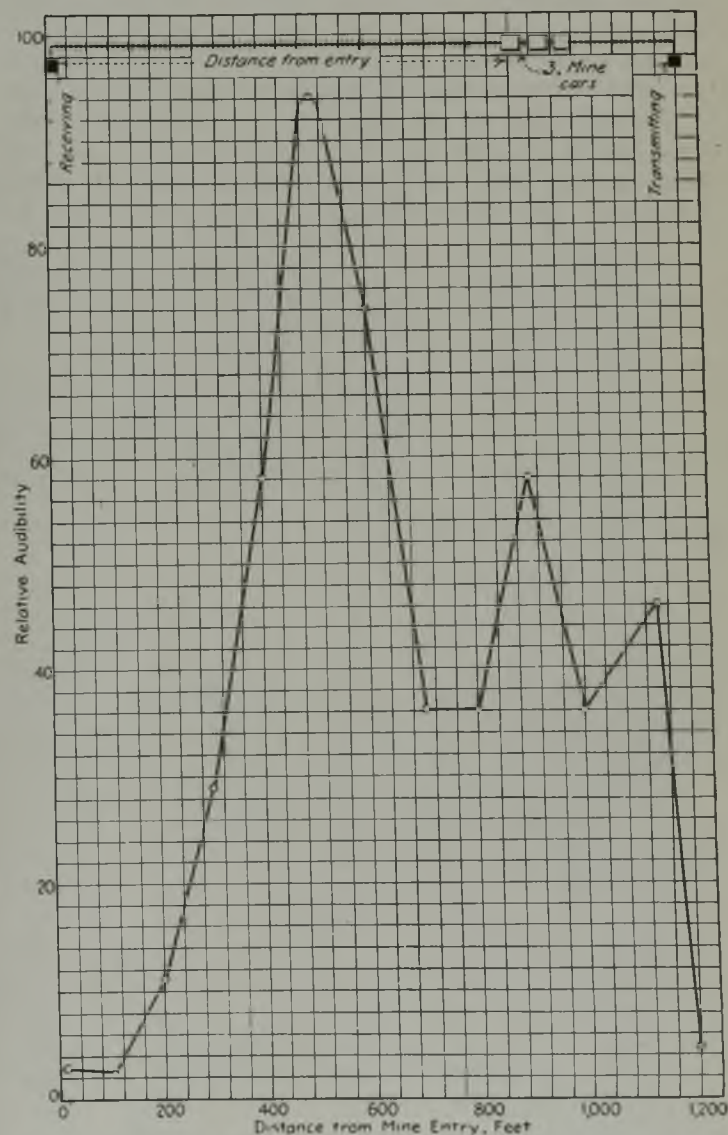


Fig. 5—How Signal Device Operated When Transmission Was Through Rails

The trip of cars seemed to act as a shield or absorbent whenever it was near either the sending or receiving station. It will be noticed that the signals were strongest when the trip of cars was about equidistant from the transmitter and receiver.

away. The low-frequency and commutator hum from leakage and induction currents from power and trolley wires drowned out the signals at distances greater than 1,900 ft. No explanation is being advanced at this time as to how or why the signals traveled along the short-circuited and cross-bonded rails. The curves of Fig. 6 show graphically the relation between signal audibility and rail transmission distance.

VERTICAL COMMUNICATION PROVED SUCCESSFUL

Vertical Transmission—In the tests conducted at the Bureau's Experimental Mine, the T.P.S. set was placed in the mine 600 ft. from the entry. Ground leads extending 100 ft. from the set were used, one lead going to ground 500 ft. from the entry and the other lead placed 700 ft. from the entry. Because of the narrowness of the entry the ground plates were laid upon the mine floor within 3 ft. of the car rails. The grounds consisted of 22-gage galvanized iron plates 6x36 in. connected to each ground lead. The connection was made to the plates by means of two battery clips.

The plates were placed on the moist mine floor, and, after sliding and pressing to give good contact, lumps of coal were placed on the plates. For mine use, iron stakes or pins, as used during the surface investigations, would in some instances be impractical. It is usually difficult to drive a peg into coal or shale strata, and such grounds are often poor electrically because of the small surface contact in friable material such as coal. A coal wedge can, however, be driven into coal.

The receiving set was placed on the surface as nearly over the T.P.S. set as could be estimated. The first reading was taken with the receiving set above the mine set. The receiving set was then moved 100 ft.

west and readings taken. Repeated readings taken every 100 ft. showed the gradual decrease in audibility of the signals. Little difficulty was encountered in transmitting signals obliquely through a distance of about 800 ft. of rock.

Similar vertical transmission tests were carried out at the Pittsburgh Terminal Coal Co.'s mine No. 3. This mine is opened by a shaft about 250 ft. deep. Signals were transmitted without much difficulty from the mine to the surface. A heavy rain fell during the first part of these tests and the receiving apparatus was not removed from the automobile. Two 100-ft. ground leads were run in opposite directions to the side of the road, and code messages easily were received from the mine. The heavy rain, and water covering the road, did not prevent the set from working.

SURFACE AND UNDERGROUND TERMINALS PARALLEL

During the second day of the tests, the ground was covered with about 3 in. of snow, and as before, code messages readily could be received. These tests were made with the surface ground terminals approximately parallel to those underground. Later tests, where the terminals were placed approximately at right angles, showed a marked decrease in signal strength-interference ratio indicating as had been found in the tests at the Experimental Mine, that the two ground terminals should be approximately parallel for maximum signal strength and a minimum of interference from low-frequency leakage currents. If the general direction of the underground terminals is not known when setting up the surface station, two ground lines at right angles to each other are run; thereby giving a maximum angle of 45 deg. between sending and receiving terminals. The signal strength is not greatly reduced by a 45-deg. angle.

Underground Tests in Illinois Mines—Additional T.P.S. data are being obtained from tests now in progress in Illinois coal mines by A. B. McCall, assisted by members of the Springfield Radio Club. The data obtained will deal largely with the results in the deep coal mines near Springfield, Ill.

The tests conducted on the T.P.S. method of signaling indicate the following: (1) The apparatus is extremely simple, reliable and foolproof. (2) The method should not be considered as a general solution of the problem of underground communication because with it only the telegraphic code can be used. (3) Reliable communication can be established through the earth a distance of only two to four times the distance between ground terminals. To transmit the energy 800 ft. through the earth requires, as a rule, ground terminals on both transmitting and receiving sets separated from 200 to 400 ft. (4) The signalling tests made with the T.P.S. set using untuned audio-frequency ground-conduction currents indicate that stray and leakage currents flowing through the ground may greatly interfere with the transmission of signals. Weak signals may be entirely lost as a result of the interference. On the surface such interference may sometimes be minimized by placing the ground leads at right angles to power lines, etc., but underground the ground terminals cannot be thus placed. (5) Present data indicate that the most feasible way of eliminating low-frequency interference is to employ loosely-coupled tuned high-frequency circuits, these being more successful than low-frequency filter circuits.

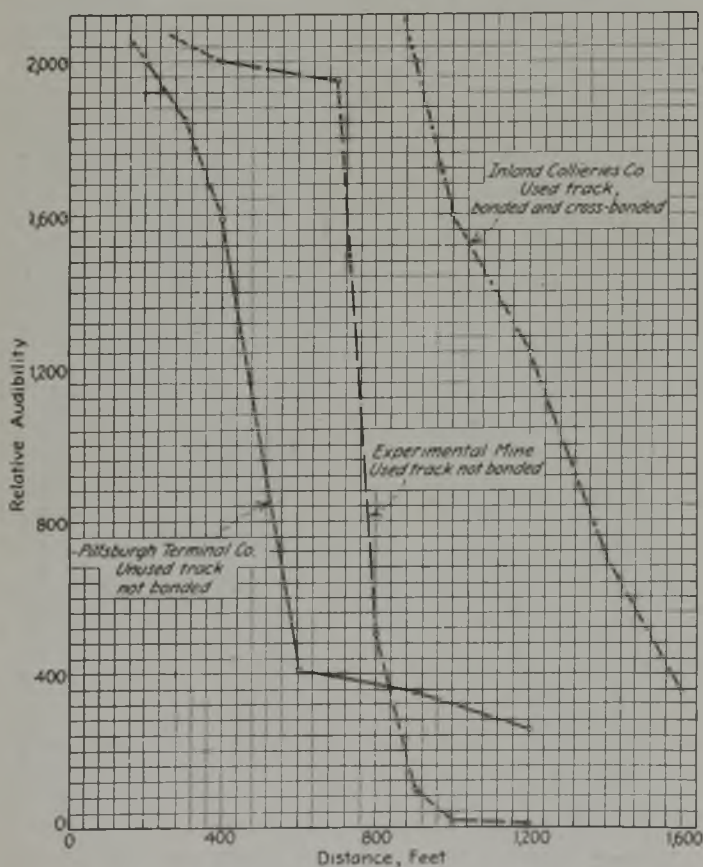


Fig. 6—Records Show Advantage of Using Bonded Mine Rails

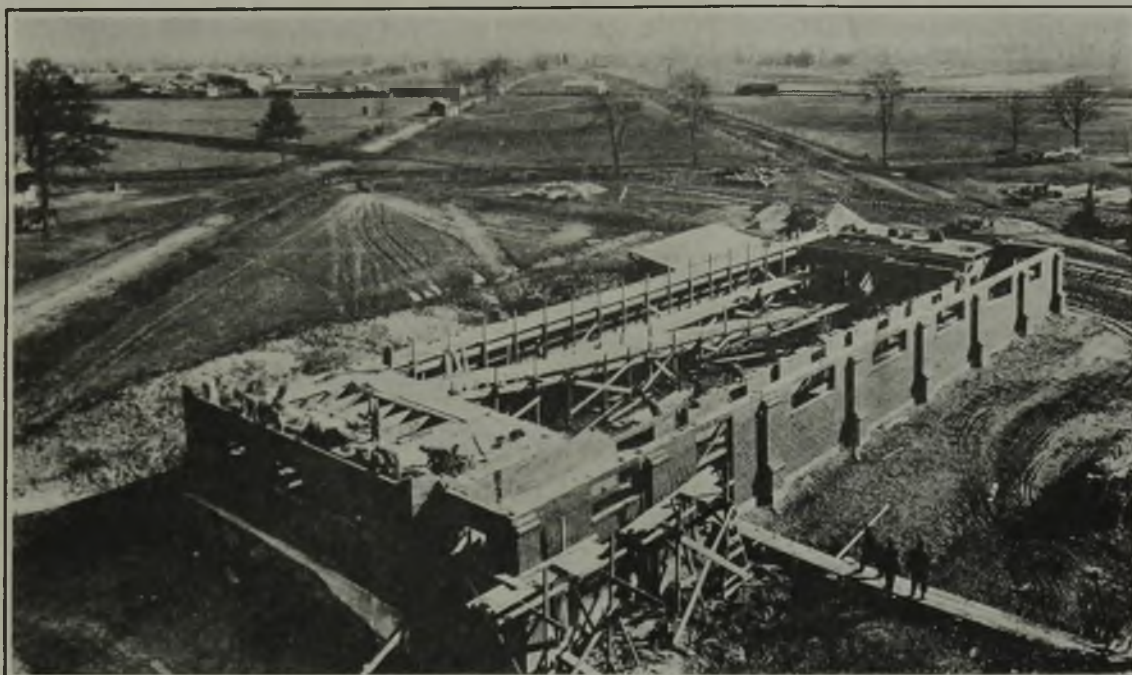
Conduction through materials of low resistance was much greater than through high resistant material. Intervening bodies of water, pipe lines, etc., take the earth currents in other directions than those upon which the operation of the equipment depends.

Illinois Coal Corporation Is Building Huge Mine Despite Adverse Economic Conditions

ONE of the baby giants among the huge coal producers of the country is the Nason mine of the Illinois Coal Corporation. This operation is now in the development stage at the new town of Nason, Jefferson County, Illinois. It is eventually expected to attain a capacity of at least 10,000 tons a day and will be equipped to hoist coal from either or both of its two shafts. The bottom, which is now in process of construction, will be so designed that hoisting can be shifted quickly from the main shaft to the airshaft in case of necessity. The mine is surrounded by the lines of the Burlington, the Chicago & Eastern Illinois and the Wabash, Chester and Western Railways, but it nevertheless lies several miles away from a railroad.

Consequently the coal corporation has built an 11-mile line of its own. This is known as the Jefferson Southwestern and extends from Mt. Vernon southwest to the town near the mine site. The owners have not yet secured permission for full operation of the line. A passenger car, driven by gasoline, however, is in service between Mt. Vernon and Nason. It forms at present the only railroad service for this latter community which already has a population of about 800. The town may be incorporated as a city as soon as it has 1,000 residents.

The Illinois Coal Corporation holds coal rights to about 30,000 acres of land in the region of Nason. This is underlaid with the No. 6 bed of Illinois coal

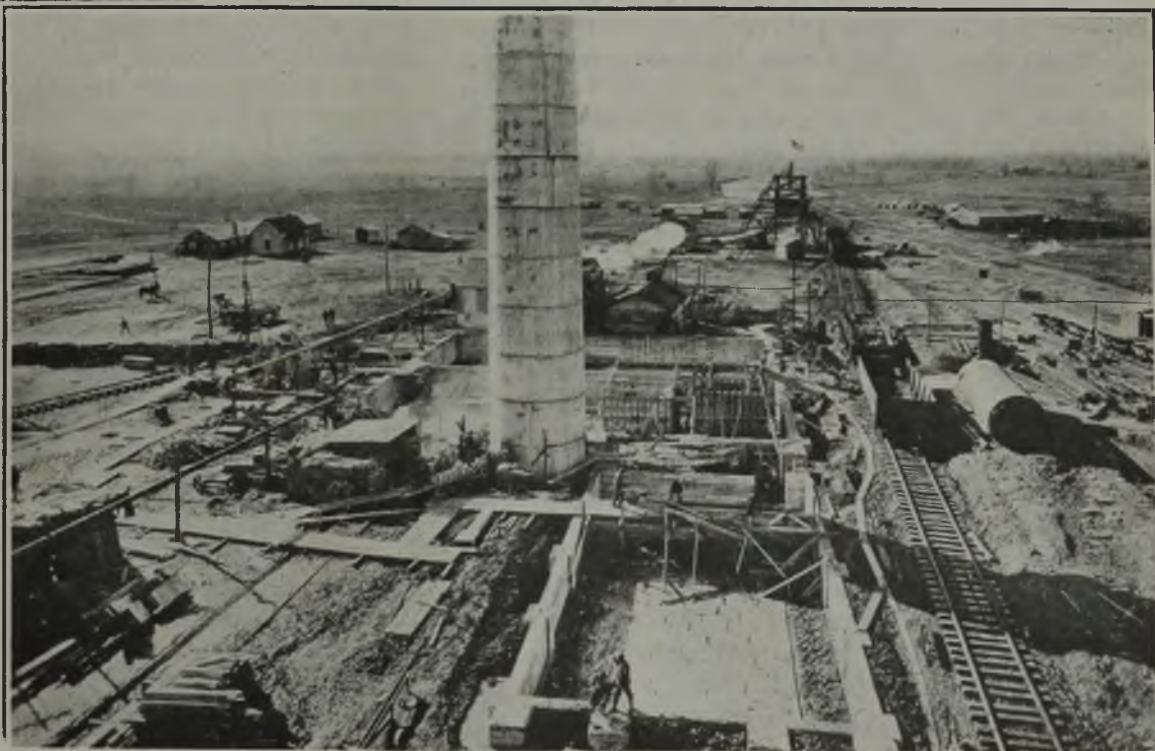


Building the Wash House

Wash houses are legal requirements at Illinois mines. As may be seen this one will be large, modern and commodious. The town of Nason, which can hardly be termed a mushroom community, may be seen spreading over the townsite in the left background of this picture.

Foundation Building

The concrete stack, 10 ft. in inside diameter and 200 ft. high has been completed, and the boiler- and engine-house foundations as well as those for the equipment they are to house are shown in the final stages of completion. Power for operation of the mine as well as for town lighting will be generated at this station. The temporary headframe above the air shaft may be seen in the rearground. About 300 tons of coal already are being hoisted from this shaft daily.





Gasoline Passenger Car

Full rights to operate the Jefferson Southwestern Railway have not yet been obtained. This car, driven by a gasoline engine, at present forms the only means of railway communication so far as passengers are concerned between the town of Nason and the outside world.

which at this point is about 8 ft. 6 in. thick and 720 ft. below the surface. The new mine is only a few miles north of the well-known Franklin County field, famous the world over for its group of huge operations including the Orient and Zeigler properties—the largest in the world. The plan is to make this operation as independent as possible. The mine and town will be served with power and lighting current from a power plant to contain three generating units, one of 500 kw. and two of 1,000 kw. capacity each. The three turbine

sets will be driven by steam from four 481-hp. water-tube boilers installed in a brick and steel power house.

The job of sinking the two Nason shafts, which lie 525 ft. apart, was a record breaker in point of speed. Actual construction was started April 23, 1923, and the shafts were completed in November and December of the same year. The "A" shaft, which is the main opening, is 12 ft. 5 in. x 21 ft. 5 in. in cross section and was sunk at an average speed of 8 ft. per day. The "B" shaft, 12 ft. 5 in. x 31 ft. 5 in. was sunk at an average of 5 ft. per day. At each shaft three crews kept the work moving every hour of the day. Six weeks was lost when the sinkers encountered between 12 and 15 ft. of quicksand 70 ft. below the surface. This had to be closed off with sheet piling. The shafts are timbered and gunnited to render them fireproof. Each is divided into three compartments. The "A" shaft has two hoisting compartments each 8 x 12 ft. 5 in. and one stairway compartment 4 ft. x 12 ft. 5 in. The larger shaft has an air compartment 14 ft. x 12 ft. 5 in. Development of the mine is proceeding rapidly from the bottom of these shafts, about 300 tons of coal being hoisted daily from the air shaft alone.

Flame Caps Have Been Used for Testing Gas for Over a Hundred Years

UP TO DATE the earliest account of a method for detecting the presence of firedamp in coal mines appears in a letter dated Oct. 18, 1813, from John Buddle to the "Society in Sunderland for Preventing Accidents in Coal Mines," wherein the utilization of the "cap" or aureole which forms around a flame burning in an atmosphere containing inflammable gas is described. The following is an extract from this letter:

"The common pit candles vary in size, but those generally used are forty-five to the pound; the wick is of cotton, and the candle made of ox or sheep tallow; but clean ox tallow is the best.

"The mode of trying the candle, as it is called, to ascertain the mixture of inflammable gas, is as follows:

"In the first place, the candle, called by the colliers the "low," is trimmed, that is, the liquid fat is wiped off, the wick snuffed short, and carefully cleaned of red embers, so that the flame may burn as purely as possible.

"The candle being thus prepared, is holden between the fingers and thumb of the one hand, and the palm of the other hand is placed between the eye of the observer and the flame, so that nothing but the spire of the flame can be seen, as it gradually towers above the upper margin of the hand. The observation is generally commenced near the floor of the mine, and the light and hand are gently raised upwards, till the true state of the circulating current be ascertained.

"The first indication of the presence of inflammable air is a slight tinge of blue or bluish grey color shooting up from the top of the spire of the candle, and terminating in a fine extended point. This spire increases in size, and receives a deeper tinge of blue as it rises through an increased proportion of inflammable gas, till it reaches the firing point; but the experienced collier knows accurately enough all the gradations of 'shew' (as it is called) upon the candle, and is very rarely fired upon, excepting in cases of sudden discharges of inflammable gas."

The earliest reference to this method of testing

appears to be that contained in "The Life of the Right Hon. Francis North," by Roger North, published in 1742, where an account is given of a visit paid in 1676 to coal mines in the Newcastle district. In a description of "damps or foul air," the author states that "an infallible test is by a dog; and the candles show it. . . . The flame of a candle will not kindle them so soon as the snuff."

Gases Caused by Detonation of Powder

A study of the products of the detonation of explosives has been undertaken at the Pittsburgh Experiment Station of the Bureau of Mines. Sampling equipment has been installed for obtaining nine simultaneous samples of the product arising from the combustion of explosives when shot under actual coal-mining conditions. The sampling device is to be used: (1) to determine whether the powder fumes concentrate at the top, bottom, or sides of the working place when liberated by different kinds of shots; (2) to take crevice samples of the concentrated fumes whenever possible, fine capillary tubes being inserted for this purpose into the crevices of the coal from which samples will be taken into evacuated gas-sample tubes, so that the carbon dioxide and carbon monoxide ratios in these samples may be compared with the ratios obtained in testing by the Bichel gage; (3) to take samples of the fumes at a point 4 ft. from the face and in the middle of the place, one, three and five minutes after shooting to determine what concentration of carbon monoxide is in the atmosphere at that point. These data should determine how soon a workman should be allowed to return to the face after he has fired a shot.

Samples of gases from the Bichel gage and of the atmosphere in the mine after a shot has been fired have been taken and analyzed to determine the percentages of oxides of nitrogen. So far these analyses have showed that the quantity of these deleterious gases in the resulting atmosphere do not exceed 0.002 per cent. These tests will be continued until the gases from many different explosives have been examined.



News Of the Industry



Senator Oddie Prepares to Introduce His Coal Measure

Embodies Portion of Proposal for Department of Mines—All Branches of Coal Industry Consulted in Formulation—Statistical Data Sought on Voluntary Basis, Reports to Be Confidential

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

AFTER having given careful consideration to the oral argument made before him by Messrs. Brydon, Cunningham and Gandy, officials of the National Coal Association, Senator Oddie, chairman of the Senate Committee on Mines and Mining, has decided that it is not in the public interest to withhold his coal bill, as they request.

While it was Senator Oddie's idea early in this session of Congress to introduce his coal bill promptly, developments were such that the need for haste passed. On learning that the Pinchot bill was not to be pressed and on the signing of the Jacksonville agreement, he felt that all the time necessary to the perfection of the measure might well be taken. Certain sections of the bill, which is a portion of his Department of Mines proposal, still are under consideration. In fact, the entire measure is subject to revision. All branches of the industry have been consulted during the formulation of the legislation.

Follows Garfield Proposal

Senator Oddie has attempted to carry into effect one of the recommendations made by Dr. Harry A. Garfield at the close of his service as Fuel Administrator. That section of the bill in its present form reads as follows:

"That the Secretary of Mines is hereby authorized and directed to provide for the organization of two advisory committees, each composed of three representatives of the producers of coal, three representatives of the consumers of coal, three representatives of the coal miners and three representatives of the transportation agencies. Said representatives of transportation agencies shall be invited to sit on said advisory committees only when the subject of the transportation of coal is under discussion, and shall not participate therein when the subject of labor relations in the coal industry is under consideration.

"The said representatives shall be selected by said Secretary from names of persons furnished by the several interests represented, and shall be appointed by the President, upon the recommendation of said Secretary. The

first of said committees shall be known as the Bituminous Coal Advisory Committee and shall advise said Secretary with respect to all matters related to and affecting the bituminous-coal mining industry and the second of said committees shall be known as the Anthracite Coal Advisory Committee, and shall advise said Secretary with respect to all matters related and affecting the anthracite-coal mining industry. Meetings of said committees shall be held, in the District of Columbia and elsewhere in the United States, as frequently as may be necessary for a thorough consideration and discussion of all matters and problems affecting all branches of the coal industry and its relations to the consuming public.

"Said Secretary shall be chairman ex-officio of said committees. He may, in his discretion, invite or request the attendance of persons not members of the advisory committees herein provided for and he may organize advisory committees of the wholesale and retail coal trade and invite or request their attendance at meetings.

"All plans for the collection of information shall be submitted to the advisory committees for their criticisms and recommendations, both as to the nature and scope of the information to be collected and as to the method of collection, analysis and presentation, but in case of disagreement the decision of the Secretary of Mines upon these points shall be final."

Seeks Voluntary Statistics

It is Senator Oddie's idea that statistical information as to coal is to be submitted on a voluntary basis, with provision, however, for the government to check any returns which may be regarded as of questionable accuracy. "Such reports," reads the draft of the bill, "shall be held confidential to the extent that no part thereof shall be divulged or published in such manner as to specifically identify such report or information with the name of the owner, operator, dealer or person providing the same; to that end for the purpose of obtaining accurate and complete information from all owners,

"Sheriff Alex Howat"! How Does That Sound?

The hundreds of coal miners loyal to Alex Howat in Kansas are trying their best to make it possible for Alex to collect a living wage from somewhere. Balked by International President Lewis in their recent attempt at the Kansas convention to get considerable back union pay for Alex for the period between the time Lewis fired him for calling an unauthorized strike and the time his normal term of district president ran out, they are now booming him for Sheriff of Crawford County, Kansas. They are not particular about the ticket he runs on. Alex's previous relation with the sheriffship of Crawford County was that of prisoner behind the bars.

operators, dealers or persons reporting and to insure the inviolability of such business facts as, if known to a competitor or others, would injure, or tend to injure, the business of the owner, operator, dealer or person so reporting, an officer shall be designated to receive and act as custodian of said reports.

Report to Be Confidential

"Said custodian shall be responsible for providing and carrying out an effective plan to prevent the accidental or unauthorized identification with its source of the information furnished in said report. For this purpose and in connection therewith the following, or some equally effective procedure shall be observed: Said custodian shall provide a report blank, so perforated as to permit its division into two parts. The upper portion shall be designed to permit the entering of the name and address of any owner, operator, dealer or person. The lower portion shall contain suitable space for the entering of the material of the report.

"Said custodian shall also provide envelopes, or other suitable mailing device, bearing the frank of the Department of Mines, the use of which is hereby authorized by owners, operators, dealers and persons in sending their reports to said custodian. The word 'confidential' in boldface type shall be printed on said envelope or suitable mailing device. All such envelopes containing the reports above mentioned shall be opened only by said custodian or by a responsible person or persons designated by him to perform such duty."

Machine Mining Gaining In West Virginia

During the fiscal year ended June 30, 1923, there were 3,954 mining machines in use at 1,208 mines in West Virginia employing 49,425 men and producing 65,304,874 gross tons of coal, which is 75.04 per cent of the total production of the state and 10,845,347 gross tons more than was mined by machine during the fiscal year ended June 30, 1922. Since 1897 the volume of machine coal has grown from 5.12 per cent of the total to 74.86 per cent of the total and the number of machines in use from 55 to 3,954.

Railroads Refuse to Join Coal Export Committee

F. R. Wadleigh, formerly Federal Fuel Distributor and head of the Commerce Department's coal division, is trying to organize a committee of coal exporters and representatives of the railroads. The coal exporters approved the plan. The carriers, however, have declined definitely to co-operate in the formation of the committee. Mr. Wadleigh has received the following letter from Robert M. Collyer, chairman of the Trunk Line Association Traffic Executive Committee:

"Subsequent to my letter of March 8, the necessity developed on short notice for a meeting of traffic executives of Eastern roads without opportunity for arranging a conference with you. The question of appointing a committee to meet with you to discuss the suggested formation of an Export Coal Committee was considered, however, and it was thought that no helpful result would come from the representation of railroad traffic officers on such a committee.

"The railroad officers specializing in coal traffic make a constant study of this great movement in all its phases—local, coastwise, and export—and as applied to railroad transportation it is believed that its problems are thoroughly understood.

"You will appreciate that if the railroads in their public-service capacity should associate themselves in an export association for one commodity they could scarcely withhold joining with all comers—an added liability that they would not wish to have attached to their already great burden in co-operating with the shippers in rate matters.

"We believe that our coal shippers understand that the Eastern railroads will be glad to receive any questions that the coal exporters may desire to have considered."

8,000 Alberta Miners Strike

Eight thousand miners in the coal fields of Alberta and eastern British Columbia (District No. 18) went on strike April 1.

The men demanded a three-year agreement in line with one adopted at Jacksonville and recently ratified by the union. Refusing this, the operators offered renewal for one year of the present contract, but without the war bonus of \$1.17 a day.



Henry Walker

The genial deputy chief of the Mines Department of Great Britain who, with Dr. R. V. Wheeler, director of the Experimental Mine of the Mines Department, has been visiting the U. S. Bureau of Mines and the mines of this country and incidentally addressing crowds of interested coal men.

How Strike of 1922 Affected Working Forces

How the strike of bituminous-coal miners in 1922 curtailed the productive capacity of various districts is shown in a table just issued by the U. S. Geological Survey. The figures represent the per cent of miners absent from work, based on the weekly reports of production and running time furnished by about 3,000 mines, supplemented by

Hoover Appointed Head of Transportation Committee

A meeting of President Coolidge's committee to study ways and means of co-ordinating rail and water transportation was held at the White House April 3, when plans were mapped out for a comprehensive study of the problem. The President named Secretary of Commerce Hoover as chairman of the committee, which includes the chairman of the Shipping Board, the president of the Fleet Corporation, the chairman of the Interstate Commerce Commission; Daniel Willard, president of the Baltimore & Ohio R.R., and A. G. Smith, president of the American Steamship Owners' Association.

The committee will seek some method of improving the system of handling freight destined for export between terminals, and other steps by which greater co-operation between rail and water lines may result. Chairman Hoover expects to consult with Senator Jones, chairman of the Senate Committee on Commerce, who suggested the study as a step in the direction of assisting the American Merchant Marine.

the annual reports of numbers of men on strike and total numbers employed. The percentage of district capacity closed during the strike varied from zero in the Logan, Hazard, Harlan and Alabama districts, less than one-half of 1 per cent in Kenova-Thacker and Pocahontas and Tug River to 92 per cent in central Pennsylvania, 95 per cent in the Pittsburgh district and 100 per cent in Illinois, Indiana and southern Ohio.

Loss of District Capacity Caused by 1922 Strike

District	Maximum Per Cent of District Capacity Closed During 1922 Strike	District Production in 1918	Tonnage Loss (Product of Columns 1 & 2)
Central Pennsylvania	92	61,629,000	56,699,000
Northwestern Pennsylvania	67 (a)	8,051,000	5,394,000
Pittsburgh, Pennsylvania	95 (c)	48,299,000	45,884,000
West Virginia Panhandle	44	3,255,000	1,432,000
Westmoreland, Latrobe, Greensburg & Ligonier	65 (a)	17,701,000	11,506,000
Connellsville	81 (a)	35,677,000	28,898,000
Somerset	88 (a)	7,194,000	6,331,000
Cumberland-Piedmont	85	7,073,000	6,012,000
Fairmont, West Virginia (d)	87	20,104,000	17,490,000
Northern Ohio	95	30,287,000	28,773,000
Michigan	100	1,465,000	1,465,000
Southern Ohio	100 (c)	15,768,000	15,768,000
Northeastern Kentucky	8	7,109,000	568,000
Hazard, Kentucky	0	2,364,000	0
Kanawha (e)	90	13,324,000	11,992,000
Kenova-Thacker	(b)	7,024,000	35,000
Logan	0	10,307,000	0
New River	58 (a)	9,929,000	5,389,000
Winding Gulf	15 (a)	5,156,000	773,000
Pocahontas and Tug River	(b)	23,128,000	116,000
Southwestern Virginia	0	9,041,000	0
Southern Appalachian (f)	57	11,712,000	6,676,000
Harlan County	21	3,202,000	672,000
Alabama and Georgia	0	19,252,000	0
Western Kentucky	7	10,833,000	758,000
Indiana	100 (c)	30,679,000	30,679,000
Illinois	100 (c)	89,291,000	89,291,000
Iowa	100	8,192,000	8,192,000
Missouri	93	5,668,000	5,271,000
Kansas	94	7,562,000	7,108,000
Arkansas	96	2,227,000	2,138,000
Oklahoma	79	4,813,000	3,802,000
Texas	25	2,261,000	565,000
North Dakota	37	720,000	266,000
Montana	98	4,533,000	4,442,000
Colorado	53	12,408,000	6,576,000
Utah	45	5,137,000	2,312,000
New Mexico	15	4,023,000	603,000
Washington	50	4,082,000	2,041,000
Wyoming	100	9,438,000	9,438,000
Average	73.3 (g)	579,281,000	425,355,000

(a) Partly estimated. (b) Less than half of one per cent. (c) Certain stripping pits and mines serving purely local trade continued to operate. (d) Includes all of northern West Virginia except the Panhandle and Cumberland-Piedmont districts. (e) Includes all high-volatile coal produced in southern West Virginia southeastern Kentucky except Harlan County. (f) Includes Tennessee and all of come in all districts at the same time the shutdown over the country as a whole was never quite as great as is here indicated.



Music Hall at Cincinnati, Ohio, Where Coal-Mining Exposition and Convention Will Meet May 12-17, 1924

Here operators, executives and engineers will discuss the vital subjects relating to mine operation and have an opportunity of acquainting themselves with the most up-to-date equipment for expediting the extraction of coal and lowering the costs of pro-

duction. Opportunities of this character are not frequently presented and once a year is none too often to take a glimpse of the new facilities for lightening the labor cost of production, which is this year of more vital importance than ever.

Pineville Mine Resumes Under the Protection of Machine Guns and Infantry

Special Dispatch to Coal Age

Louisville, Ky., April 7.—The Liberty Coal & Coke Co., on Straight Creek, Pineville, Ky., resumed operations this morning, with thirty-five men, with the camp protected by two companies of national guardsmen, one a machine gun company of sixty men, and the other an infantry company of the same number, the troops having arrived on Sunday.

Governor Fields and state military officials had quietly sent the troops on advice of the sheriff at Pineville. It was reported that shots were exchanged this morning under cover of darkness at about 2 o'clock, prowlers having been discovered near the power plant. It is reported that the valley is now protected by machine-gun nests on the hillsides and patrols of infantry. The miners are working today, all men being armed.

Company officials reported that they were willing to confer with Governor Fields relative to the situation, but would not arbitrate with former union employees, who had left the company employment.

They Shoot Non-Union Men Down in Kentucky

Two non-union miners were shot and one of them killed by mountainside riflemen near Pineville, Ky., April 3. They were employees of the Liberty Coal &

Jobs For Jobless Miners

The United Mine Workers Journal, official union publication, recognizing that many union miners must leave the industry, announces that Secretary of Labor Davis will "place the entire resources of the Department of Labor at the command of mine workers who wish to obtain employment in other industries." The director of the Federal Employment Bureau of the department receives applications and tries to find the jobs. The *Journal* quotes Secretary Davis as saying: "There is no need of men now employed in mines working short time, because there is plenty of opportunity for steady work in other industries."

Coke Co. on Straight Creek. This company recently reopened its property on the 1917 wage scale and evicted from company houses all miners who did not go back to work. Last November the company asked its miners to decide between working at the 1917 scale and shutdown of the mines. The question went to an arbitration board, which never has reported. After a period of shutdown the company decided to operate on the 1917 basis of wages and invited its union men to remain on that basis if they wanted to. Some did. Non-union men were brought in from Virginia and elsewhere and finally some evictions of union men who refused to work were made. Then the shooting began.

Yukon Blast Unofficially Laid To Open Lamp in Gas Pocket

The explosion at No. 2 mine of the Yukon-Pocahontas Coal Co., on March 28, which took a toll of 24 lives, was caused by the flame from a miner's lamp when a gas pocket was encountered, according to an unofficial opinion following a preliminary inspection by R. M. Lambie, chief of the State Department of Mines. More complete investigation seems to indicate that when the second trip was wrecked those who remained behind to help replace the motor on the track escaped and that those who went forward met death when they encountered the gas pocket.

West Kentucky Still Wobbles On Wage Problem

No settlement is yet in sight between the union and the operators in western Kentucky—or that part of western Kentucky whose contract was extended from April 1 to April 15 to permit a possible new agreement. Meantime the impression is spreading fast that no contract will be signed and that the whole territory will be non-union by summer.

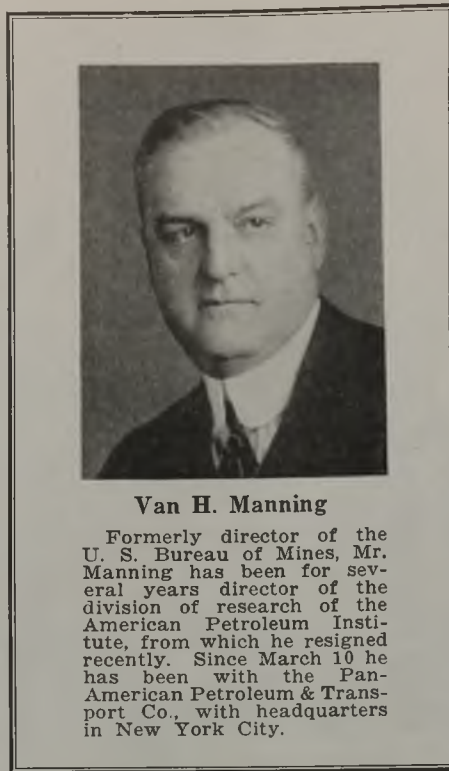
In Henderson County, in the northern edge of the western Kentucky field, where a sort of agreement with the union ran out April 1, no new agreement has been made and the region with its ten mines is now on a non-union basis.

Fewer Coal-Mine Fatalities In February

The fatal-accident rate for coal mines during February, 1924, showed a gratifying reduction as compared with the preceding month and with February, 1923, according to reports received from state mine inspectors by the Bureau of Mines. For each million tons of coal produced the death rate was 2.69 as compared with 3.94 in the previous month and 6.07 for February last year. For bituminous mines alone, the rate for February, 1924, was 2.32, as compared with 6 for February, 1923; for anthracite mines the rate was 5.05 as against 6.43.

The actual number of fatalities reported during February was 138, of which 118 occurred at bituminous mines and 40 at anthracite mines. In February last year the number of fatalities was 303, of which 253 were at bituminous mines and 50 at anthracite mines. The 303 fatal accidents in February, 1923, include the loss of 120 lives in an explosion at Dawson, N. M.; during February, 1924, no single disaster killed as many as five men.

The record for the first two months of 1924 shows a production of 112,071,000 tons of coal, 461 lives lost, and a fatality rate of 4.11 per million tons, the bituminous rate being 3.84 and the anthracite rate 5.79. For the corresponding months of 1923 the output of coal was 108,824,000 tons, the number of deaths was 509 and the fatality rate was 4.68, the bituminous rate being 4.49 and the anthracite 5.70. Thus the fatality rate for January and February of the present year is about 12 per



Van H. Manning

Formerly director of the U. S. Bureau of Mines, Mr. Manning has been for several years director of the division of research of the American Petroleum Institute, from which he resigned recently. Since March 10 he has been with the Pan-American Petroleum & Transport Co., with headquarters in New York City.

cent below that for the same months last year.

All of the main causes of fatal accidents show reduced fatality rates per million tons in 1924, as indicated by the following figures:

	Jan.-Feb. 1923	Jan.-Feb. 1924
Falls of roof and coal.....	1.819	1.633
Haulage.....	.680	.473
Gas and dust explosions.....	1.314	.723
Explosives.....	.128	.125
Electricity.....	.110	.072

Moses Weakening on Printing Of Coal Commission Report

While it has been impossible to convince Senator Moses, of New Hampshire, chairman of the Senate Committee on Printing, that the report of the Harding Coal Commission should be printed, he did show signs of weakening last week when his attention was called to an opinion that his action is one of the best cases on record of foregoing the harvest as an economy after the expense of producing the crop.

The printing of the entire report, a portion of which was not mimeographed, will cost, the Public Printer estimates, \$22,000. An effort now is being made to exclude certain portions of the report and a new estimate is being prepared.

Coal Consumption and Power Output by Utilities Higher

Electric public-utility plants consumed 3,627,322 net tons of coal during January, according to a report just issued by the U. S. Geological Survey. This compares with 3,392,983 tons consumed in December and 3,474,152 tons in November. Fuel oil consumed by utility plants in January totaled 1,562,622 barrels, compared with 1,473,045 barrels in December and 1,379,281 barrels in November.

The average daily production of electricity by public-utility power plants during January was 167,000,000 kw.-hr., which exceeded all previous records, being 3.5 per cent higher than in November, last, when the previous high mark was set.

Coal-Mine Fatalities During February, 1924, by Causes and States

(Compiled by Bureau of Mines and Published by Coal Age)

State	Underground										Shaft				Surface				Total by States								
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip, or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes.	Railway cars and locomotives.	Other causes.	Total.	1924	1923
Alabama	3		1	1		1						1	8													8	5
Alaska																										0	0
Arkansas																										0	1
Colorado		3											3													5	4
Illinois													14													14	19
Indiana													9													9	5
Iowa													1													1	2
Kansas																										0	2
Kentucky	4	2	2						1	1			10													13	10
Maryland																			2							0	0
Michigan																										0	0
Missouri	1												1													0	0
Montana																										0	2
New Mexico																										0	121
North Dakota																										0	0
Ohio	4		2										6													0	0
Oklahoma																										0	0
Pennsylvania (bituminous)	12	2	4										19						3							22	37
South Dakota																										0	2
Tennessee	1												2													0	0
Texas																										2	1
Utah		1											1													0	0
Virginia	1	1											3													1	0
Washington																										3	4
West Virginia	13	3	6			2							24							2	1					1	4
Wyoming	2												2													27	22
													2													2	2
Total (bituminous)	58	12	24	1		3	1	4	1	2			2108						6	2	1				110	253	
Pennsylvania (anthracite)	10		4			4							6	2					6						40	50	
Total, February, 1924	68	14	28	2		7	1	4	1	2			8135	2	1				3	6	1		2	110	158		
Total, February, 1923	84	6	38	11	120	3	2	5	2	3			7281			3			3	2	4		3	819	303		

B. M. Clark Sees Gloomy Outlook for Central Pennsylvania with Renewed Pact

The outlook for business in the coal mines of central Pennsylvania under the present agreement is not at all reassuring, according to a statement issued April 4 by B. M. Clark, president of the Central Pennsylvania Coal Producers' Association. "The renewal of the wage agreement for three years at Philadelphia," said Mr. Clark, was in line with the generally accepted policy throughout the United States, to take the coal business out of the public eye and to bring peace to the industry, which has been in a chaotic condition since the outbreak of the European War.

"That section of the industry which maintains its relations with its employees through the United Mine Workers, and is generally described as unionized, in renewing the agreement for three years took into consideration the effect upon the public mind of another great coal strike. It also is the opinion of many of the leading coal operators that the operation of economic forces would bring about any adjustments that may be necessary in wages or other conditions in the industry. It is also the opinion of these operators that the peaceful method of adjusting the coal industry to present business conditions can be brought about more satisfactorily without a strike than with one.

High Wage Scale a Mistake

"If business conditions in the industry remain as bad as they are today—and indications are they will grow worse—the miners and operators will soon be brought to realize the mistake of trying to maintain a very high wage scale in the face of the overwhelming force of competition from fields where wage rates are much lower and accordingly production costs much lower than they are in the unionized sections of the industry.

"At the present time in central Pennsylvania there are approximately 550 tippie mines completely idle out of a total number of 1,000. These mines represent about 50 per cent of the productive capacity of the district, or, roughly speaking, 2,500 carloads per day, and employ about 30,000 men. Of these 30,000 men a number have gone to work in other union mines in the district; some have gone to work in other occupations, and still others have gone to work in mines operating in the non-union section of Pennsylvania.

"It is conservatively estimated that of the 30,000 men formerly working in the mines that are now totally idle, about 12,000 have found work as indicated. This would leave 18,000 idle miners now in the district. The mines that are at work, generally speaking, are working from two to three days per week. Their production per day has been increased by higher efficiency of the men due to short running time and by the additional men obtained from the mines that are totally idle, so that the working time of the regular employees in mines still at work is being constantly decreased.

"Many of the mines that have been operating have been filling contracts that were made a year ago. Practically 85 per cent of the coal contracts expire at the end of the coal year, April 1. The present low prices offered for contract business have precluded the possibility of many central Pennsylvania producers taking business this coal year. Railroad-fuel contracts are being made at prices below the cost of production under the union scale in central Pennsylvania. This also is true of other contractors such as public utilities, manufacturing and industrial plants. The net result of this condition is that there is only about 30 per cent of the total volume of contract business on the books of central Pennsylvania operators today as compared with the amount of such business on the books of the same operators one year ago.

Working Time at Low Level

"The full significance of this statement may be grasped by the following tabulation of working time of the total 653 tippie mines located on the Pennsylvania R.R. in the central Pennsylvania district:

Mines idle	341
Mines working 1 day.....	49
Mines working 2 days.....	60
Mines working 3 days.....	56
Mines working 4 days.....	65
Mines working 5 days.....	51
Mines working 6 days.....	31
	653

"On the New York Central, out of a total of 190 mines, 86 are completely closed down. This also is true on the Pittsburgh & Shawmut and Pittsburgh, Shawmut & Northern railroads.

"The Buffalo, Rochester & Pittsburgh Ry. is one of the largest coal-originating railroads in our district. Due to the fact that the contracts which the Rochester & Pittsburgh Coal & Iron Co. held for business last year have expired and the company has been unable to renew them under the present conditions, the company has closed its mines located in Helvetia, Eleanora, Adrian, Aultman, Ernest, McIntyre, Snyder, Coy, Whiskey Run and Nesbit Run. These mines when working produce 11,000 tons per day and employ 3,000 men.

"Practically every mine in the Broad Top region, where they employ 1,200 miners, is now idle without hope of operation in the near future. Mines employing about 1,000 men on the Allegheny Valley division of the Pennsylvania R.R. in our district have been idle for months, and this condition will continue.

"The total production of the central Pennsylvania district should exceed 60,000,000 tons per year. The union mines in the central Pennsylvania district ought to produce 45,000,000 tons of this amount. It is agreed by many men in the business that the union mines in central Pennsylvania will not produce, if the present situation continues throughout the coal year, more than 15,000,000 tons, or a loss to the unionized mines of central Pennsylvania of a possible production of 30,000,000 tons.

Monongahela Field Adopts Jacksonville Agreement

At a joint wage conference of the Monongahela Coal Operators Association of West Virginia and representatives of the United Mine Workers, held in New York City on April 2 and 3, the Jacksonville agreement was adopted effective three years from March 31.

"The labor cost of producing coal in central Pennsylvania under the union scale is approximately \$2 per ton. The mines in the non-union fields of Pennsylvania that have reduced their wages to what is known as the 1917 base can produce coal at \$1.40 labor cost per ton. The present wages paid in the Pocahontas field of West Virginia will permit production of coal at a labor cost of \$0.90 per ton. Present wages in the New River field of West Virginia will permit production of coal at a labor cost of \$1.12 per ton. These figures, of course, do not include the cost of supplies and general overhead. Labor cost is only 70 per cent of the total cost of production. These fields have a productive capacity of about 50,000,000 tons of the same quality and character of coal—namely, low volatile—as is produced in the central Pennsylvania district and is sold in the same markets.

"The full force of this competition is now reflecting itself in the idle mines and miners in the union fields of central Pennsylvania."

No Wage Adjustment in New River Field

Adjustments of wages and working conditions have not been necessary this year in the New River field of West Virginia, as in other years, so that the new coal year was ushered in without much attention. With the disintegration of District No. 29, which formerly embraced the New River field, miners and operators in that field have been free to make their own agreements for the last two years and wage scales and working conditions have been worked out in that way, with wages rising as prices rose and with wages lowered as prices dropped to the point where the operators could no longer pay the higher wages so that under existing conditions New River mines are paying their employees on the basis of the 1917 wage scale. There are a few exceptions of course, among them the Low Moor company, the New River, Pocahontas Consolidated and the Fordson company.

Even with lower wages in effect however the market is in such shape that operations are becoming more irregular and many concerns are operating at a loss but are nevertheless continuing operations in order to afford employment to their men and in order to hold their organizations together.

In such sections as Keeney's Creek, where miners have been employed in connection with development work, it has been necessary to give the men furloughs.

Brophy Refutes Clark

Clearfield, Pa., April 7.—John Brophy, president of district No. 2, United Mine Workers of America, has issued the following statement in reply to B. M. Clark, president of the Association of Bituminous Coal Operators of Central Pennsylvania:

"Last week at Philadelphia the operators of central Pennsylvania signed a wage agreement for three years. This week they say, 'It can't be done.'"

"They said the agreement was made in order to take the coal business out of the public eye. But is it taken out of the public eye when they issue such statements in the press as that released on April 4, in which they predict that the whole district is going to the demnition bow-wows?"

"They tell us there are many idle mines in the district. We agree with them—we are very well aware of the fact. But their statement is misleading because it fails to state that the other bituminous fields throughout the country are in the same (or worse) plight."

"For a remedy they suggest the same old panacea they have been offering for the last thirty years—lower wages."

"They say competition is too keen to admit of high wages—if wages were lower they would get more orders and the miners would get more work. They tell of the non-union fields of West Virginia, where the wages are far below the union rates. But do the low wages there provide steady work? The last report of the Geological Survey (March 29), which covered the week ending March 15, shows the New River field producing 46.9 per cent of capacity; the Pocahontas field producing 54.9 per cent of capacity; the central Pennsylvania field producing 55.3 per cent of capacity, and the non-union Maryland field was producing only 38.7 per cent."

"The miners know full well that lower wages never increase the opportunity to work but only decrease their earnings and will not agree to any such 'wage adjustment' as suggested in the operators' statement."



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James Brown

"Jamie" Brown, Scotch coal miner, is extremely busy these days "learning the ropes" to play the principal part as King George's representative during his residence at Holyrood Palace next month in the capacity of Lord High Commissioner to the General Assembly of the Church of Scotland. He is being advised and assisted in the intricacies of the forthcoming ceremonies by the Duke of Atholl, former High Commissioner. The Duchess of Atholl has put her knowledge at the disposal of Mrs. Brown, a former mill girl, and the Marchioness of Ayr, wife of the Lord Lieutenant of the County of Ayr, will be lady in waiting to "Mrs. Jamie."

"The truth of the matter is that the bituminous-coal industry is overdeveloped and will stay in the public eye until some order is brought into it. We now have a capacity sufficient to produce twice as much coal as the market can consume. Consequently slack work is a chronic disease of the industry and will remain so until something is done to check development in order to permit demand to catch up with production."

Coal Co. Allowed \$373,401 Amortization Claim

J. M. Clack, an auditor of the Internal Revenue Bureau, which is being investigated by the Finance subcommittee of the Senate, explained to the subcommittee the tax case of the Berwind-White Coal Mining Co. of Philadelphia, which had been mentioned before the committee as one concern that had its case reopened after an amortization claim had been disallowed. It put in a claim for amortization for 1918 of \$257,668.16, and for 1919 of \$66,966.10, a total of \$324,634.26, on a power plant that was built to assist in the operation of coal mines during the war.

A revised claim was filed Oct. 1, 1921, for \$575,591.31 amortization. The increase was explained as being due to the fact that the 1918 law put a limitation of 25 per cent on deductions for amortization. Engineers C. G. Woolson and J. P. Moore examined the return and on May 12, 1922, recommended that the claim be disallowed in full. Their reason was given as being that the plant had no excess operating capacity on account of the war, but was needed for post-war activities.

A new investigation was made on protest of the company and Engineer J. W. Swaren recommended an amortization allowance of \$176,953.25. The taxpayer protested this. A re-examination was made and on Nov. 18, 1922, an allowance was made of \$373,401. This was based, it was stated, on additional data and was the result of conferences.

Mr. Clack added that the uniform practice had been to allow amortization to coal companies on their plants erected during the war to take care of increased production.

Senator Couzens said the successive steps in the case of the Berwind-White company disclosed the chance for questionable conduct in the handling of these income tax cases.

"There is an enormous responsibility of the department," the Senator continued, "and this shows the opportunity for favoritism, influence, and even for graft, which I do not charge."

Estimated Monthly Output of Bituminous Coal by States, 1923^(a)

(IN NET TONS)

State	January	February	March	April	May	June	July	August	September	October	November	December
Alabama	1,692,000	1,449,000	1,692,000	1,491,000	1,554,000	1,492,000	1,442,000	1,549,000	1,462,000	1,595,000	1,487,000	1,295,000
Arkansas	146,000	109,000	108,000	93,000	93,000	105,000	112,000	125,000	136,000	136,000	125,000	112,000
Colorado	987,000	917,000	875,000	747,000	732,000	756,000	688,000	755,000	862,000	973,000	959,000	1,049,000
Illinois	9,428,000	8,078,000	7,893,000	6,233,000	6,088,000	5,747,000	5,602,000	6,455,000	6,943,000	7,688,000	6,934,000	6,911,000
Indiana	2,975,000	2,511,000	2,662,000	2,150,000	1,775,000	1,855,000	1,933,000	1,984,000	2,292,000	2,406,000	2,252,000	2,205,000
Iowa	698,000	617,000	627,000	460,000	445,000	436,000	415,000	498,000	540,000	595,000	595,000	574,000
Kansas	455,000	381,000	384,000	323,000	334,000	320,000	322,000	372,000	392,000	416,000	422,000	379,000
Kentucky	3,401,000	2,855,000	3,194,000	3,028,000	3,479,000	3,374,000	3,607,000	3,953,000	3,550,000	4,100,000	3,491,000	2,968,000
Maryland	282,000	239,000	277,000	249,000	244,000	240,000	208,000	229,000	194,000	188,000	170,000	180,000
Michigan	145,000	108,000	147,000	93,000	53,000	52,000	72,000	95,000	112,000	129,000	108,000	86,000
Missouri	425,000	353,000	303,000	268,000	276,000	265,000	270,000	299,000	331,000	353,000	335,000	322,000
Montana	379,000	332,000	324,000	180,000	196,000	171,000	179,000	229,000	289,000	388,000	356,000	277,000
New Mexico	294,000	216,000	221,000	223,000	234,000	205,000	202,000	200,000	212,000	240,000	234,000	219,000
North Dakota	151,000	101,000	105,000	43,000	44,000	41,000	41,000	62,000	75,000	111,000	98,000	78,000
Ohio	3,519,000	2,727,000	3,284,000	3,091,000	3,739,000	3,821,000	3,544,000	3,778,000	3,427,000	3,594,000	3,049,000	2,427,000
Oklahoma	333,000	302,000	305,000	246,000	246,000	255,000	248,000	297,000	324,000	336,000	360,000	298,000
Pennsylvania	13,894,000	11,446,000	13,600,000	13,446,000	14,678,000	14,674,000	14,403,000	15,290,000	13,459,000	13,066,000	11,258,000	10,786,000
Tennessee	590,000	510,000	537,000	496,000	534,000	496,000	475,000	522,000	488,000	534,000	486,000	432,000
Texas	104,000	86,000	81,000	74,000	88,000	85,000	91,000	98,000	96,000	109,000	109,000	79,000
Utah	466,000	372,000	298,000	275,000	315,000	375,000	354,000	357,000	406,000	532,000	446,000	404,000
Virginia	866,000	791,000	968,000	946,000	1,026,000	971,000	933,000	1,019,000	927,000	972,000	829,000	752,000
Washington	326,000	310,000	336,000	148,000	195,000	195,000	153,000	206,000	238,000	307,000	295,000	241,000
West Virginia	7,709,000	6,652,000	7,887,000	7,726,000	9,164,000	9,051,000	9,300,000	9,749,000	8,724,000	9,496,000	7,681,000	6,961,000
Wyoming	884,000	672,000	662,000	511,000	523,000	489,000	516,000	727,000	724,000	897,000	813,000	782,000
Other States (b)	29,000	26,000	32,000	24,000	21,000	19,000	16,000	16,000	13,000	16,000	19,000	19,000
Total bituminous production	50,178,000	42,160,000	46,802,000	42,564,000	46,076,000	45,490,000	45,126,000	48,864,000	46,216,000	49,177,000	42,911,000	39,836,000

(a) United States Geological Survey, March 22, 1924. Revised in accordance with more complete information than was available at the time of the first publication in the weekly coal report. (b) Includes Alaska, California, Georgia, Idaho, North Carolina, Oregon and South Dakota.

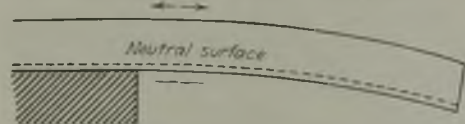


Problems In Underground Management



How Far Beyond Excavated Area Is Surface Broken?

Many British inquiries into the character of subsidence have shown that the surface of the ground is broken considerably back of the line of fracture in the excavation below. The angle between a vertical line from the face of the excavation and a line drawn from the point of break on the surface down to the face is called the angle of draw because owing to the tensional stresses



Neutral Surface Near the Coal

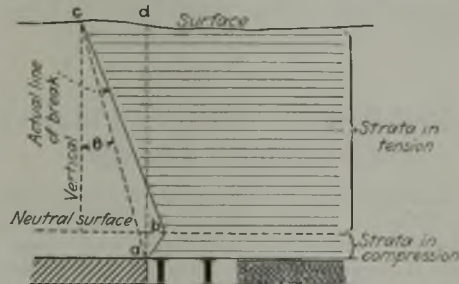
Where the material is stronger to resist compression than tension the surface of no strain or neutral surface lies near the coal.

the measures are broken beyond the coal face.

Ira C. F. Statham in a thoughtful paper read before the Yorkshire branch of the Institute of Mine Surveyors of Great Britain summarizes the findings in various parts of that country. Of course, the roof does not subside at the point where the draw or fracture from tension takes place. It is the point of break at the surface and not the point of subsidence. In fact though Mr. Statham does not say so, the surface actually may rise at that point. The coal being crushed, however, the area of actual subsidence is larger than the area of excavation, for the face of the coal is crushed downward under the

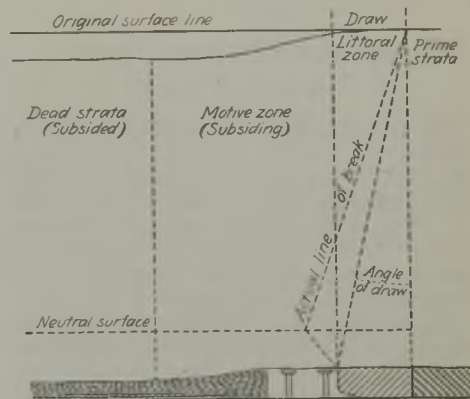
load and the clay is squeezed out into the excavated area.

Among Mr. Statham's notable remarks is the following: "Rocks are stronger in compression than in tension. The average figures for sandstone are: Tensile strength in short tons per square inch 0.46; compressive strength 3.93; hence sandstone is about nine times as strong in compression as in tension, so that the neutral axis will be roughly one-ninth of the depth above the seam or eight-ninths below the surface." Apparently he believes the roof below the neutral axis breaks in a line over the excavation and that this break at the neutral axis meets another break extending down from the point of draw on the surface, this fracture, of course, making a larger angle with the vertical than the line of draw. Most of us



As Statham Views Roof Fracture

The roof does not fracture from *a* to *c* but breaks forward to *b* which is on the neutral surface and backward to *c* at the surface. This is an interesting viewpoint. Some have thought the nether roof which did not constitute part of the monolithic roof broke over the excavation, but Mr. Statham declares it is that part of the roof proper below the neutral surface which breaks in that manner.



How Subsidence Develops


Mr. Statham designates three zones, the dead or subsided area, the motive or subsiding area and the littoral zone which lies over the standing coal and moves but little.

would be disposed to believe that the break over the excavation was an entirely unrelated break in the nether roof or draw slate which does not form any part of what Mr. Statham well names the "absolute" roof. But as no one has ever been immured in the roof when it tore apart, possibly this question may not be settled for some time. Here are two breaks of unlike direction, what more simple explanation can be imagined than that they meet at an angle on the neutral axis or neutral surface? So that is where Mr. Statham places it, probably without any justification.


Observations show, says Mr. Statham, that not only breaks but also actual subsidence commences ahead of the coal face or over the solid coal face and is a maximum behind the coal face.

Summary of Subsidence Observations Quoted by Various Authorities

Authority	Locality	Depth Ft.	Thickness Ft.	Dip. Deg.	Draw Ft.	Angle of draw Deg.	Subsidence Ft.	Subsidence P.C.	Remarks
Knox, G.	Ayrshire		6.0			15			
Fayol, H.		321	8.0				2.08	25	First slice
			8.0				1.92	23	Second do
Dixon, J. S.	Bent. Coll., Lanarkshire	650	5.5	3	100		4.00	73	Max. subsidence 186 ft. back from face
		646			83	Av. 8	3.76	68	
Kirkup		240			66	14-18			
		600			180-200				
					433		4.5		
Snow, C.	Hickleton								
Piggford, J.	Terversal and Pleasley, Notts and Derby	600	5' 6"			16			
Hay, W.	Shirebrook	1,500-1,700	5.0	2½	240-300	8-10	1.34-1.74	Av. 30	
Kay, S. R.		360	5.0					70	
Lloyd, W. D.	Yorkshire	1,066	3.83	1½	nil				Width of excavation, 128 ft.
					20	1.14	0.28	7.3	194 ft.
					30	1.6	0.57	15.0	325 ft.
					40	2.14	0.75	19.0	477 ft.
					60	3.23	1.06	28.0	557 ft.
					84	4.5	1.23	32.0	666 ft.
					95	5.1	1.47	36.0	823 ft.
					109	5.83	1.65	43.0	823 ft. 6 months after stoppage
					119	6.4	1.75	46.0	283 ft. 12 months maximum
Morgan, R. C.	South Wales	1,920	9.0	4.75			2.75	48	Six ft. worked to dip. Took place 40 ft. behind face 67 days after passing
		1,650					2.83	43	6.58 ft. worked to rise 40 ft. from face, 92 days after passing
		2,140				8.25	3.41	57	To strike 70 ft. from face, or 122 days after passing
		2,410					3.16	56	To dip 105 ft. from face 125 days after passing
Greaves, P.	Wakefield		3.5				2.42	69	
Whitelock, C. H.	South Yorks.	400-700				5.7-9.5		40-75	Subsidence complete 5 years after working



Practical Pointers For Electrical And Mechanical Men



Cheap and Efficient Battery Transfer Rack

By constructing the battery compartments of storage-battery locomotives so that one man can readily remove and replace them the cost of operation is often considerably reduced. Sometimes it is convenient to be able to use a chassis for more than one shift thus saving the purchase of an additional locomotive. In that case the unit should be provided with two batteries and with means for their rapid interchange. A removable battery arrangement is also desirable where charging must be done during the day, no power being available for night charging.

Where the battery on the chassis is not sufficient to do a day's work the locomotive may often be enabled to give satisfactory service when an additional battery is provided and arrangements are made for the quick replacement of one battery by another.

There are, of course, many ways of removing battery compartments and conditions at the mine will determine the best method to be adopted. However, what undoubtedly is the cheapest and easiest method of accomplishing this operation is shown in the accompanying drawing. This method is recommended by the Ironton Engine Co. It avoids the introduction of additional tracks with their frogs and switches, thus saving much space. It does away with the older method of lifting the battery.

Rollers are provided on the chassis and similar rollers on platforms at either side of the track. Racks are provided on the bottom of the battery compartment and arranged to engage spur pinions mounted on the chassis, and driven by a roller chain and sprockets through spur gearing to which a removable crank is attached.

With this system, and without any

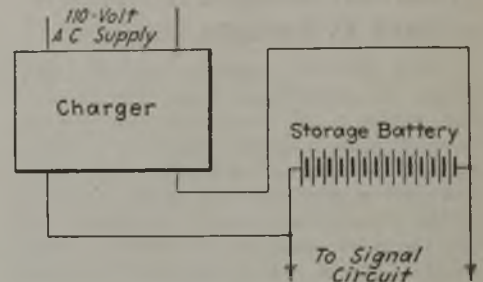
especial effort, a change of batteries has been made in five minutes. This includes disconnecting the discharged battery, removing it, putting on a charged battery and connecting it up, ready for use. This would not be possible with any arrangement that required the shifting of the locomotive from one track to another.

One man working the crank can easily move off the discharged battery and move on the charged one. With this arrangement as only one track is required the locomotive chassis does not have to be pushed around by hand from one track to another when the transfer of the battery is being made. Space must be provided on each side of the track sufficient to store one battery, but a series of these platforms can be provided on the same track to take care of any number of locomotives.

Bell-Ringing Battery Floats On Automatic Charger

A number of mining companies in the anthracite field are now installing Magnar vibrating rectifiers and nine-cell storage batteries on shaft and slope signal systems. The rectifier and battery are usually placed in the engine house outside, the former being connected to the 110-volt alternating-current circuit. The rectifier is equipped with a small vibrating unit which charges the battery continually at from 0.1 to 0.5 amp. The signal bell circuit is in series with the battery.

When the outfit is installed the resistor on the charger is set at 3/10 amp. and by checking the gravity of the battery for the first two or three days, it is possible to regulate the current to the proper charging value. The plan is to float the battery on the charging circuit so as to charge at a rate fractionally higher than the load



Battery Floats on Charger

This little rectifier keeps the battery fully charged, thus greatly increasing its life. Renewals are infrequent and proper voltage is always available for the whole signal system.

which the signal bell circuit puts upon the battery.

The rectifier has proved to be dependable. There is little wear and tear on the vibrating contacts, and in case of a power interruption the vibrator stops and starts again with the resumption of power. The battery should be made up of nine 2-volt cells of from 35 to 40 ampere-hour capacity. In this class of service the battery lasts from 5 to 6 years.

The battery is always in a practically fully charged condition—most of the acid is out of the plates and in the solution, thus considerably increasing the life.

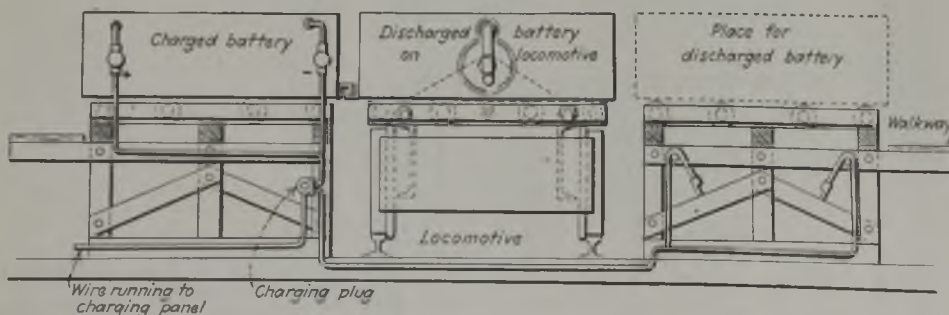
CHAS. L. LEAF.

Don't Blame Mine for the Faults of Those in It

A recent article by T. F. McCarthy, published in *Coal Age* on the subject of the care of electrical mine equipment, prompts me to make the following comments:

We all know that the conditions under which electrical equipment must operate in the mines are necessarily bad, for moisture and dust are always present. However, we too often hear some one say that a certain piece of equipment is not operating satisfactorily because the mine conditions are unfavorable. Breakdowns and delays are not always ascribable to this cause. Often, I have almost come to believe that a fuse on a direct-current coal cutter is an accessory which has been practically forgotten. I have seen only too many fuse blocks which have been tampered with and damaged, because some one has replaced the proper fuse with a rail spike, or a heavy piece of copper wire.

Much of the high maintenance cost on locomotives is due to broken track bonds, which are allowed to continue as such until the locomotive absolutely refuses to move its load. Another cause



One Man Can Transfer Battery in Five Minutes

The locomotive stops between the two platforms and delivers its battery to the empty platform, taking a fully charged battery from the opposite side of the track.

It will be noticed that both platforms are equipped with charging cable thus obviating the necessity of any additional handling of the discharged battery.

of high maintenance to haulage equipment is the bad condition of the feeder circuits. Very seldom do we find the feeder wire properly spliced or tapped, so as to form a low-resistant joint. Cables are often suspended on props by means of spikes and in many cases both the positive and negative wires may be found buried in rocks and mud.

A serious offense often committed by locomotive motormen is to apply the hand brake so as to block the locomotive wheels before the controller is turned on. I have seen motormen do this and then turn the controller to the "full-on" position, after which they would gradually release the brake and slowly start the loaded trip. Then again, many battery locomotives are required to operate under full load for from eight to sixteen hours, and the battery is charged in from four to eight hours. Naturally, a very high current is needed to charge the battery in so short a time and its capacity and life are seriously affected.

On one occasion, I found a gathering pump motor driving its load through a gear which was submerged in about 4 in. of water. The motor was of the open type and the water picked up by the gear was carried directly onto the commutator and windings. These and similar conditions exist in nearly every mine with which I have been acquainted, and it is my opinion that much can be done to reduce the maintenance cost of mine electrical equipment by giving the apparatus reasonable attention, and by placing it where conditions of operation are favorable and are so maintained.

Linton, Ind.

J. R. LUXTON.

Protecting Motor-Generators And Rotary Converters

In an article on direct-current circuit breakers by Royce L. Grimes, which appeared in the Feb. 7 issue of *Coal Age* are remarks on the protection of rotary converters and motor-generator sets.

In one part of this article Mr. Grimes pointed out the danger of the load on one of several interconnected machines increasing to a point where the direct-current circuit breaker should open up but fails to do so, either due to the type of the breaker used or to some part not functioning properly. It is true that if such machines were connected in parallel with other direct-current generators and the load was sufficiently high to trip the alternating-current circuit breaker, serious trouble would almost certainly result.

To meet just such conditions it has been the practice of our company to supply standard control equipment for synchronous converters, induction motor-generator sets, and synchronous motor-generator sets, with alternating-current and direct-current breakers so interlocked that in case the alternating-current breaker is opened for any cause whatever, the direct-current breaker will also be tripped open. Incidentally, it may be added that this protective feature is furnished not only when the machines operate in parallel with another source of power but also when used independently. We have always found this necessary because in the de-

velopment of the electrical system of a mine it is quite probable that some machines originally operated separately will be tied in together. When this occurs it will be essential that this protective feature be installed and in operation.

Whenever any type of converter unit is operated in parallel with a direct-current generator, driven by a direct-connected prime mover such as a water-wheel or steam turbine, we furnish, in addition to the interlocking circuit mentioned above, a reverse-current relay. This relay is connected so that it will trip both the alternating-current and direct-current breakers at a current value sufficiently low to insure that the machine will be stopped before it has reached such a speed as will cause the overspeed trip to function. This is added protection to prevent the possibility of any mechanical damage to the commutator and the windings of the machine which might otherwise result if the machine should overspeed.

When power-converting machines are operated with their direct-current ends in parallel, but with their alternating-current ends fed from different alternating-current circuits a reverse-current relay is furnished and connected so that both the alternating and direct-current systems will be disconnected from the machines in case of failure of alternating-current power supply. Such protection as this is no doubt better than any other yet designed, because it does not depend upon the speed of the machine, thus making the possibility of any danger more remote.

N. S. TAYLOR,

Switchboard Engineer.

Westinghouse Electric & Mfg. Co.

E. Pittsburgh, Pa.

Cleating and Supporting Copper

Properly supported copper stands up well against vibration. In fact, one finds it extensively used in certain applications where vibration occurs, because of its good behavior in this respect. But improperly supported, copper fails miserably under vibration. This point is frequently ignored in connecting car wiring cables to the motor leads when cleats are not applied. Care should be observed to study this point with the purpose of properly locating the cleats in supporting the cables. It often happens that the weight of a solid connector, even though it may look rather small, is sufficient under vibration to cause the copper strap or stranded cable to break at a point just behind the connector where stresses are localized.

Sickness of Copper

Copper is subject to a form of sickness which so far as has been experienced is peculiar to copper alone. All commercial copper contains a small amount of oxygen in the form of copper oxide, without which it has poor mechanical characteristics. When it is heated in a flame which is rich in free hydrogen, this hydrogen unites with oxygen, forming free copper and steam.

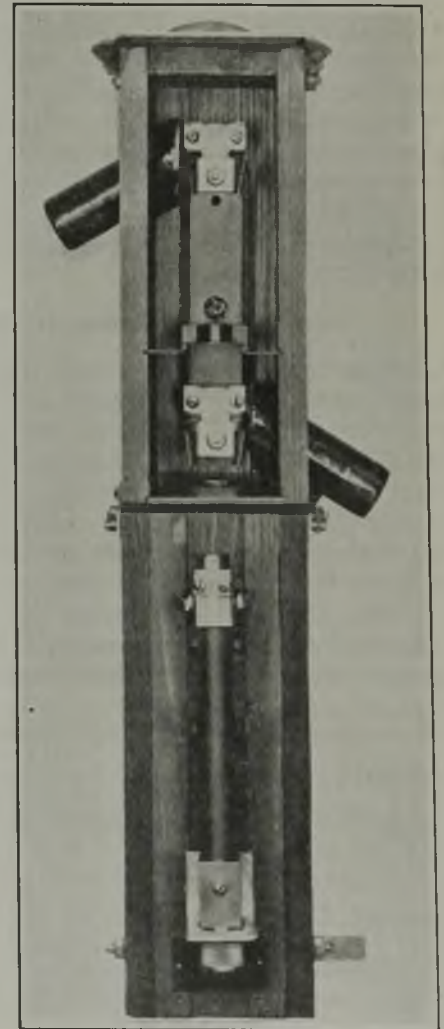
It is a peculiar characteristic that the hydrogen will readily enter the hot copper, but the steam cannot get out. The copper is thus not only weakened by the elimination of the copper oxide but the high pressure steam expands, producing a spongy effect which still further weakens the copper. This effect is, of course, greatest near the surface. This peculiar form of sickness should be guarded against by the operating men.

Safety Fuse Box Proves Successful

The accompany illustration shows a fuse box which we are using on outdoor circuits. Its peculiar advantages around mining properties lies in the fact that when it becomes necessary to renew the fuse the door of the box acts as a switch and the fuse is replaced between two "dead" clips.

The box may easily be placed on a cross-arm in a position where it will be impossible for the workman to come in contact with an electrically charged conductor. Whenever a section of a line must be cut off for test or repair the fuse box may be opened and used as an extra protection against accident.

O. E. KENWORTHY.



Combination Fuse and Switch Compartment

This fuse may be replaced with absolute safety even if some one may have forgotten to cut off the power. When the door of the fuse compartment is opened the circuit is broken and the fuse is replaced in the two "dead" clips on the door.



Production And the Market



Coal Markets Continue to Display No Animation; Contracting Backward; Strike Menace Recedes

April 1 has come and gone and the soft-coal market is rapidly getting no better. For weeks the consumer has been awaiting the coming of that fateful day—"to see what would happen" before making a move in the coal market. Not much happened, and he hasn't done a great deal about it. Industrial clouds continue to disappear from the horizon as one by one district settlements are signed, northern West Virginia and central Pennsylvania, which came in last week, having been followed by the Monongahela district, which also signed up for three years. Agreements in Kanawha and western Kentucky have been deferred and the Southwestern fields and Alberta have completely suspended.

While these successive adjustments of wages and working conditions are hailed in many quarters as an assurance of industrial peace, the consumer interprets them as removing the incentive to buy coal and seems to have decided to play the waiting game to the limit. Even the contract business usually in evidence at this time is far behind the seasonal level.

Coal Age Index declined 2 points to 171, as of April 7, the corresponding price being \$2.07. This compares with \$2.09 on March 31.

Steam Prices Firmer in Middle West

Steam coals in Illinois and Indiana are somewhat firmer, most of the other sizes being in difficulty. "No bills" are much in evidence. Business is hard to get in Franklin County, the mines that are running getting from two to three days a week. Duquoin and Jackson County find it even worse, many mines closing down and the others working only one and two days a week. Demand for screenings is good in the Standard field, but little else that is favorable can be reported.

Kentucky markets are unsettled pending a wage settlement, April 15, and little business is being booked.

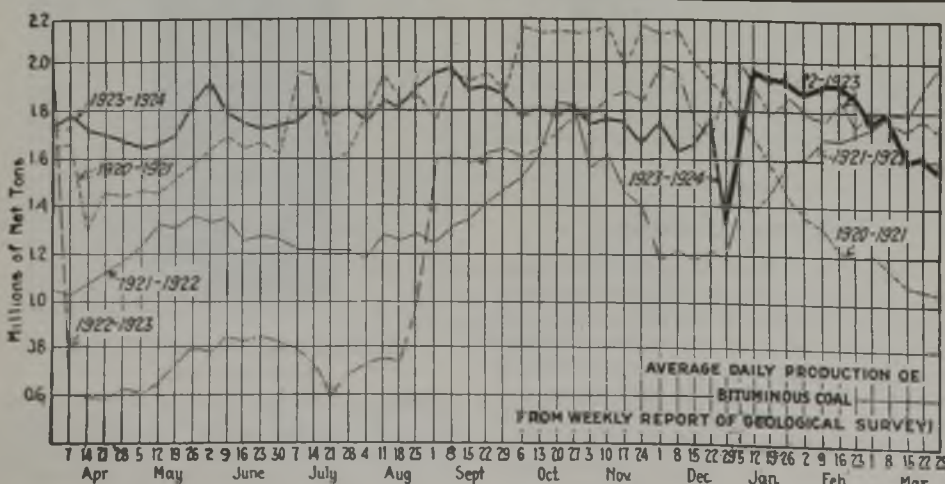
Business in the Northwest has gone flat, prices having broken as the result of some dock companies making cuts and the others following suit, but business is not eagerly sought at the reduced level. The spurt of brisk business in the Southwest continued right up to April 1, when operations were suspended until a wage agreement shall have been negotiated. A cold snap in Colorado and Utah has helped business there, and the outlook is still bright.

Better Tone in Cincinnati Market

Buying in Ohio markets is at a low ebb, the trade in general being quiet, though the tone at Cincinnati is better. Contracting for steam tonnage is lagging, awaiting prices on railroad fuel, and production is falling off steadily. Not a ray of hope is discernible through the deadly dullness that has settled over New England—low as production has fallen, demand is too meager to absorb it. Consumers are indifferent in the Atlantic seaboard markets. Supply and demand in West Virginia are more nearly equal, and as a result prices are more stable.

Production of bituminous coal during the week ended March 29, according to the Geological Survey, amounted to 8,837,000 net tons, which was 424,000 tons less than was produced during the previous week. Output of anthracite totaled 1,942,000 net tons, an increase of 138,000 tons compared with the preceding week.

New price circulars on anthracite came out April 1, reductions by the companies on domestic sizes ranging from 40c. to 60c., except on pea, on which the cut ranged up to \$1.15. Reductions on steam sizes range from 35c. to 50c. on buckwheat and from 25c. to 50c. on rice, there being no cut in the price of barley. Independents are said to be shading prices in order to move their product.



Estimates of Production

(In Net Tons)

BITUMINOUS		
Week Ended	1922-1923	1923-1924
March 15.....	10,428,000	9,626,000
March 22(a).....	10,424,000	9,261,000
March 29(b).....	10,430,000	8,837,000
Daily average.....	1,738,000	1,473,000
Coal year to date.....	427,598,000	540,803,000
Daily average to date.....	1,396,000	1,773,000
ANTHRACITE		
March 15.....	2,057,000	1,941,000
March 22.....	2,126,000	1,804,000
March 29.....	2,008,000	1,942,000
Coal year to date.....	46,486,000	93,060,000
COKE		
March 22(a).....	384,000	315,000
March 29(b).....	388,000	296,000
Calendar year to date.....	4,658,000	3,661,000

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

Midwest Steam Firms Up

A slight firming up of steam coal in Illinois and Indiana was the only change marked during the week in the Midwest market. This was insufficient to change prices much, but most steam coals stuck closer to circular than they have been doing. Most other sizes were in trouble in those states, however. "No bills" in all the domestic sizes were backing up in southern Illinois in spite of an earnest effort to move them and of the recent cut in their prices. Some business is expected in this district from the Missouri Valley region since the shutdown of the Southwestern Interstate district mines of Kansas, Oklahoma and Missouri, but the effect of the shutdown has not yet had time to make any great difference.

The domestic trade of the Midwest region is taking a little Pocahontas at the prevailing \$2@\$2.25 price on mine run and \$3@\$3.25 on lump and egg, but the volume is small. The April 1 cut in anthracite started a small movement of hard coal in domestic sizes to dealers throughout the Midwest region, as was expected. A good many dealers had withheld orders for two or three weeks before April 1 awaiting the drop. Present prices are expected to prevail throughout the summer.

Such mines as are open are getting from two to three days per week in Franklin County and all mines have "no bills" in some sizes. Railroad tonnage has practically stopped. The independent operators are having a hard time getting any business, in view of low prices made by the organization operators. In the Duquoin and Jackson County fields most mines are shutting down and business is hard to find with mines working one and two days a week.

In the Mt. Olive district business is bad. Steam sizes are in good demand, but lump fails to move. The operators at Mt. Olive are asking \$2.75@\$2.85 on 2-in. and 3-in. lump, whereas 6-in. lump from surrounding mines is selling as low as \$2.65. In the Standard district screenings are in good demand. Everything else is just plugging along with many mines shutting down and all mines with "no bills."

Cool weather keeps St. Louis coal yards busy, on small lots principally and on the cheaper grades. The only change in the market has been that of Carterville, which was reduced from \$8 to \$7.25 and \$7.50. There is a fairly good demand for this in small quantities. Anthracite, smokeless and coke are a little bit slow, with new prices expected at once. The new prices on coke are: Byproduct, \$10.75; gas-house, \$10.25, for sidewalk delivery. Local steam wagonload is good and carload is fairly active. Country domestic is

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

Low-Volatile, Eastern	Market Quoted	Apr. 9 1923	Mar. 24 1924	Mar. 31 1924	Apr. 7 1924†	Midwest	Market Quoted	Apr. 9 1923	Mar. 24 1924	Mar. 31 1924	Apr. 7 1924†
Smokeless lump	Columbus...	\$6.25	\$3.60	\$3.25	\$3.25@3.50	Franklin, Ill. lump	Chicago...	\$3.85	\$2.85	\$2.85	\$2.75@3.00
Smokeless mine run	Columbus...	4.25	2.10	2.10	2.25@ 2.50	Franklin, Ill. mine run	Chicago...	3.10	2.35	2.35	2.25@ 2.50
Smokeless screenings	Columbus...	3.75	1.60	1.60	1.75@ 2.00	Franklin, Ill. screenings	Chicago...	2.05	1.80	2.05	2.10@ 2.25
Smokeless lump	Chicago...	6.10	3.25	3.25	3.00@ 3.25	Central, Ill. lump	Chicago...	2.75	2.60	2.60	2.50@ 2.75
Smokeless mine run	Chicago...	3.75	2.10	2.10	2.00@ 2.25	Central, Ill. mine run	Chicago...	2.10	2.10	2.10	2.00@ 2.25
Smokeless lump	Cincinnati...	6.00	3.25	3.25	3.25@ 3.50	Central, Ill. screenings	Chicago...	1.60	1.55	1.65	1.60@ 1.75
Smokeless mine run	Cincinnati...	3.85	2.20	2.10	2.00@ 2.25	Ind. 4th Vein lump	Chicago...	3.35	2.85	2.85	2.75@ 3.00
Smokeless screenings	Cincinnati...	3.85	1.75	1.80	1.75@ 2.00	Ind. 4th Vein mine run	Chicago...	2.85	2.35	2.35	2.25@ 2.50
*Smokeless mine run	Boston...	6.25	4.65	4.20	4.15@ 4.25	Ind. 4th Vein screenings	Chicago...	1.85	1.85	1.95	1.90@ 2.00
Clearfield mine run	Boston...	2.90	2.05	2.00	1.65@ 2.50	Ind. 5th Vein lump	Chicago...	2.85	2.60	2.60	2.25@ 2.50
Cambria mine run	Boston...	3.75	2.60	2.55	2.00@ 2.90	Ind. 5th Vein mine run	Chicago...	2.10	2.10	2.10	2.00@ 2.25
Somerset mine run	Boston...	3.35	2.30	2.10	1.75@ 2.50	Ind. 5th Vein screenings	Chicago...	1.55	1.60	1.65	1.60@ 1.75
Pool 1 (Navy Standard)	New York...	4.00	3.00	3.00	2.75@ 3.00	Mt. Olive lump	St. Louis...		2.85	2.85	2.75@ 3.00
Pool 1 (Navy Standard)	Philadelphia...	4.10	3.00	3.00	2.75@ 3.25	Mt. Olive mine run	St. Louis...		2.50	2.50	2.50
Pool 1 (Navy Standard)	Baltimore...					Mt. Olive screenings	St. Louis...		1.50	1.50	1.50
Pool 9 (Super. Low Vol.)	New York...	3.35	2.20	2.20	2.00@ 2.40	Standard lump	St. Louis...	2.50	2.30	2.35	2.25@ 2.50
Pool 9 (Super. Low Vol.)	Philadelphia...	3.30	2.30	2.20	2.00@ 2.45	Standard mine run	St. Louis...	1.85	1.95	1.95	1.90@ 2.00
Pool 9 (Super. Low Vol.)	Baltimore...	3.25	2.25	2.25	2.00	Standard screenings	St. Louis...	1.10	1.30	1.20	1.10@ 1.30
Pool 10 (H.Gr. Low Vol.)	New York...	2.85	1.95	1.85	1.75@ 2.00	West Ky. lump	Louisville...	2.60	2.85	2.75	2.25@ 2.50
Pool 10 (H.Gr. Low Vol.)	Philadelphia...	2.80	1.85	1.85	1.70@ 2.00	West Ky. mine run	Louisville...	1.85	1.60	1.60	1.25@ 1.75
Pool 10 (H.Gr. Low Vol.)	Baltimore...	2.90	1.90	1.90	1.75	West Ky. screenings	Louisville...	1.75	1.30	1.00	1.10@ 1.35
Pool 11 (Low Vol.)	New York...	2.50	1.40	1.40	1.25@ 1.60	West Ky. lump	Chicago...	2.85	2.60	2.60	2.50@ 2.75
Pool 11 (Low Vol.)	Philadelphia...	2.40	1.65	1.50	1.30@ 1.70	West Ky. mine run	Chicago...	1.80	1.20	1.10	1.00@ 1.25
Pool 11 (Low Vol.)	Baltimore...	2.25	1.60	1.60	1.50						

High-Volatile, Eastern

		2.30	1.50	1.50	1.40@ 1.65
Pool 54-64 (Gas and St.)	New York...	2.30	1.50	1.50	1.40@ 1.65
Pool 54-64 (Gas and St.)	Philadelphia...		1.60	1.55	1.45@ 1.70
Pool 54-64 (Gas and St.)	Baltimore...	2.25	1.70	1.70	1.50@ 1.70
Pittsburgh sc'd gas	Pittsburgh...	3.00	2.55	2.55	2.35@ 2.50
Pittsburgh gas mine run	Pittsburgh...		2.30	2.30	2.25
Pittsburgh mine run (St.)	Pittsburgh...	2.00	2.10	2.10	1.75@ 2.00
Pittsburgh slack (Gas)	Pittsburgh...	2.00	1.35	1.25	1.25@ 1.35
Kanawha lump	Columbus...	4.00	2.55	2.55	2.40@ 2.80
Kanawha mine run	Columbus...	2.50	1.55	1.55	1.50@ 1.80
Kanawha screenings	Columbus...	2.35	1.05	1.05	1.25@ 1.35
W. Va. lump	Cincinnati...	3.60	2.50	2.25	2.00@ 2.50
W. Va. gas mine run	Cincinnati...	2.60	1.30	1.30	1.25@ 1.50
W. Va. steam mine run	Cincinnati...	2.35	1.30	1.30	1.25@ 1.50
W. Va. screenings	Cincinnati...	2.35	.85	.85	.80@ 1.00
Hocking lump	Columbus...	3.00	2.55	2.55	2.40@ 2.70
Hocking mine run	Columbus...	2.10	1.70	1.65	1.60@ 1.75
Hocking screenings	Columbus...	1.75	1.05	1.05	1.25@ 1.40
Pitts. No. 8 lump	Cleveland...	2.90	2.35	2.35	2.00@ 2.75
Pitts. No. 8 mine run	Cleveland...	2.20	1.80	1.80	1.75@ 1.85
Pitts. No. 8 screenings	Cleveland...	2.00	1.25	1.20	1.20@ 1.40

South and Southwest

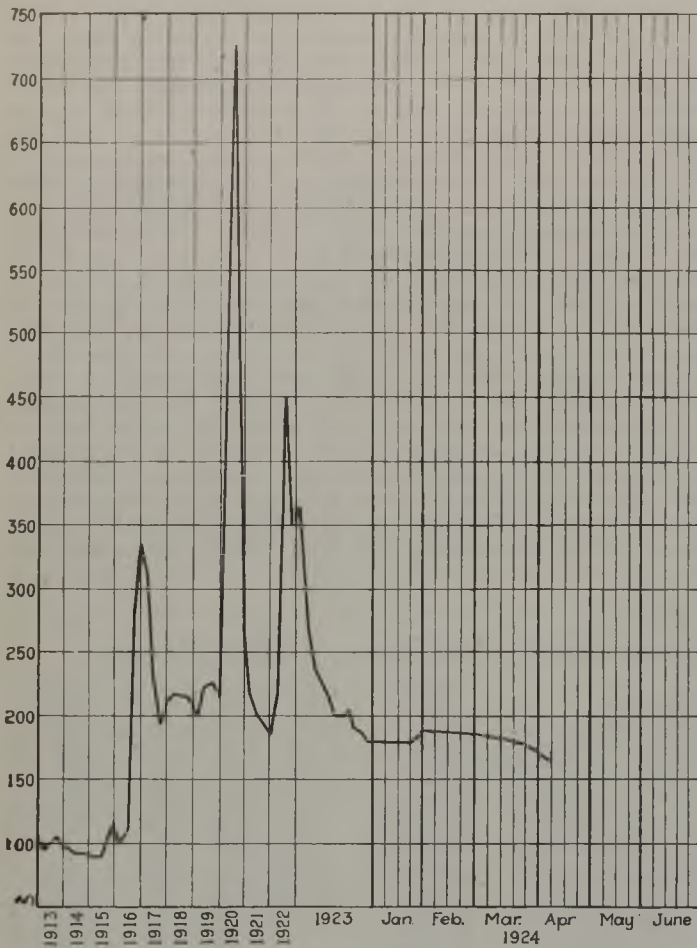
		2.50	2.60	2.60	2.50@ 2.75
Big Seam lump	Birmingham...	2.50	2.60	2.60	2.50@ 2.75
Big Seam mine run	Birmingham...	2.10	2.00	2.00	1.75@ 2.25
Big Seam (washed)	Birmingham...	2.35	2.20	2.20	2.00@ 2.40
S. E. Ky. lump	Chicago...	3.85	2.85	2.60	2.25@ 2.50
S. E. Ky. mine run	Chicago...	2.85	1.60	1.60	1.40@ 1.85
S. E. Ky. lump	Louisville...	4.00	3.00	3.00	2.60@ 2.75
S. E. Ky. mine run	Louisville...	2.80	1.70	1.70	1.25@ 1.75
S. E. Ky. screenings	Louisville...	2.50	.95	.95	.85@ 1.25
S. E. Ky. lump	Cincinnati...	3.50	2.85	2.10	2.25@ 2.50
S. E. Ky. mine run	Cincinnati...	2.50	1.45	1.35	1.25@ 1.50
S. E. Ky. screenings	Cincinnati...	2.35	.85	.85	.75@ 1.00
Kansas lump	Kansas City...	3.85	4.50	4.50	4.50
Kansas mine run	Kansas City...	3.25	3.25	3.25	3.25
Kansas screenings	Kansas City...	2.60	2.50	2.50	2.50

* Gross tons, f.o.b. vessel, Hampton Roads.
† Advances over previous week shown in heavy type, declines in italics

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

	Market Quoted	Freight Rates	April 9, 1923		March 31, 1924		April 7, 1924†	
			Independent	Company	Independent	Company	Independent	Company
Broken	New York...	\$2.34		\$7.75@8.35		\$8.00@9.25		\$8.00@8.65
Broken	Philadelphia...	2.39		7.90@ 8.10				8.50@ 8.65
Egg	New York...	2.34	\$8.25@10.00	8.00@ 8.35	\$7.75@8.25	8.25@ 9.25	\$7.75@8.25	8.25@ 8.65
Egg	Philadelphia...	2.39	9.25@ 9.50	8.10@ 8.35	8.50@10.00	8.75@ 9.25	8.25@ 9.40	8.60@ 8.65
Egg	Chicago*	5.06	12.00@ 12.50	7.20@ 8.25	7.50@ 8.80	8.00@ 8.35	7.69@ 7.81	7.65@ 7.72
Stove	New York...	2.34	8.25@ 10.00	8.00@ 8.35	8.75@ 9.25	8.25@ 9.25	8.50@ 9.00	8.25@ 8.85
Stove	Philadelphia...	2.39	9.25@ 9.50	8.15@ 8.35	9.85@ 11.00	8.90@ 9.25	8.60@ 9.50	8.65@ 8.85
Stove	Chicago*	5.06	12.00@ 12.50	7.35@ 8.25	7.95@ 9.25	8.00@ 8.35	7.90@ 8.03	7.81@ 8.03
Chestnut	New York...	2.34	8.25@ 10.00	8.00@ 8.35	8.75@ 9.25	8.25@ 9.25	8.50@ 9.00	8.25@ 8.75
Chestnut	Philadelphia...	2.39	9.25@ 9.50	8.15@ 8.35	9.85@ 11.00	8.90@ 9.25	8.60@ 9.50	8.65@ 8.75
Chestnut	Chicago*	5.06	12.00@ 12.50	7.35@ 8.35	7.95@ 9.25	8.00@ 8.35	7.81@ 7.94	7.72@ 7.95
Range	New York...	2.34		8.30		9.00		8.50
Pea	New York...	2.22	6.30@ 7.50	6.00@ 6.30	4.50@ 5.25	5.75@ 6.65	4.50@ 5.00	5.50@ 6.00
Pea	Philadelphia...	2.14	7.00@ 7.25	6.15@ 6.20	4.75@ 6.50	6.35@ 6.60	6.00@ 6.75	6.00
Pea	Chicago*	4.79	7.00@ 8.00	5.49@ 6.03	4.50@ 5.60	5.40@ 6.05	5.13@ 5.36	5.36@ 5.55
Buckwheat No. 1	New York...	2.22	2.50@ 3.25	3.50@ 4.15	2.25@ 2.75	3.00@ 3.50	2.25@ 2.75	3.00@ 3.15
Buckwheat No. 1	Philadelphia...	2.14	3.50	3.50	2.25@ 3.00	3.50	2.75@ 3.00	3.00
Rice	New York...	2.22	2.00@ 2.50	2.50	1.75@ 2.25	2.00@ 2.50	1.75@ 2.25	2.00@ 2.25
Rice	Philadelphia...	2.14	2.50	2.50	1.75@ 2.25	2.50	2.00@ 2.25	2.25
Barley	New York...	2.22	1.25@ 1.50	1.50	1.50@ 1.75	1.50	1.50@ 1.75	1.50
Barley	Philadelphia...	2.14	1.50	1.50	1.25@ 1.50	1.50	1.50	1.50
Birdseye	New York...	2.22		1.60	1.60@ 1.75	1.60	1.60@ 1.75	1.60

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



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

Index	1924		1923	
	April 7	March 31	March 24	April 9
Weighted average price	\$2.07	\$2.09	\$2.13	\$2.32

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.

fairly good for cheaper grades; country steam is quiet. Business is better at this particular season this year than in many years, considering the fact that there is no strike, and on the other hand nothing that would indicate a prosperous territory in the vicinity of St. Louis.

Kentucky Is Upset

Failure of the operators and union leaders to reach a wage scale agreement and extension of the old contract to April 15 leaves the western Kentucky field in an unsettled condition, as operators do not know what conditions will prevail after April 15, and are unable to book much business. Some sections are taking the bull by the horns and going non-union now, their old contracts having expired, regardless of the extension at Louisville.

Demand for coal is very quiet, and while western Kentucky screenings have advanced from 90c. to \$1.10@1.35 it is due principally to lack of production rather than real demand. Mines are operating from one day to a day and a half a week, with just a few getting in two days. Prices of prepared sizes have slumped off, and egg, lump and block are all quoted at \$2.25@2.50 this week, and probably can be shaded a little in some instances.

Some eastern Kentucky operators are asking \$2.75 and even \$3 for block coal, but \$2.50 appears to be about the top at this time. Many of the eastern Kentucky mines are non-union, and can therefore make the price without hurting themselves; the rest are being forced to come to it. Some contract business is pending, but no new business has been reported as placed over the past several days, although railroad contracts are due. There is no early inquiry on Lake business.

Northwest Trade Goes Flat

The market has dropped off at Duluth all around, with bituminous suffering to the extent of \$1 to \$1.50 and anthracite off about 25c. The break was caused by three dock companies which sent around a circular letter cutting prices, and the other companies followed suit. The prices are: Kentucky lump, \$5.50; mine run, \$5; screenings, \$4.25; Youghiogheny lump, \$5; mine run, \$4.50; screenings, \$4; Hocking lump, \$5; mine run, \$4.50; screenings, \$3.75; Splint lump, \$5; mine run, \$4.50; screenings, \$4.25; Pocahontas lump, \$7; mine run, \$5.75; screenings, \$4.75. Anthracite prices are these: Stove, \$13; egg, \$12.70; nut, \$13; pea, \$10; buckwheat, \$8. The market has no activity. The docks are not anxious to sell at the new prices, as they claim they will lose money, and the public is showing no disposition to buy.

The coal market continues quiet at Milwaukee with demand for domestic grades fluctuating with weather conditions. The steam trade also is light. Consumers who put in heavy supplies last autumn in anticipation of a strike in the spring are now working off their surplus.

April brought a reduction of 50c. per ton on anthracite and \$2 per ton on coke. Egg size hard coal is now held at retail at \$15.90; stove, \$16.30; nut, \$16.15; pea, \$13.80, and buckwheat, \$11, with an extra charge of 75c. per ton when coal is carried to bins. Large sizes of Solvay coke now sell at \$12.90 and pea coke at \$9.90. Gas coke is quoted at \$11.75 for egg and nut, and \$10 for small and pea coke. Dock companies announce that there will be no change in soft coal prices until May 1.

West Does Some Business

A brisk business preceded the closing of mines through the Southwestern district April 1, pending the agreement of operators and miners on a new wage scale. Industries and railroads bought heavily, leaving small surplus of screenings at the mines. Domestic sizes moved more slowly, and mines report some surplus. But, as it is generally expected that the suspension of work will continue through April, this is causing no worry.

Business continues fairly good in the Colorado coal market. Mines worked on an average of a little better than three and one-half days last week. The cheaper grades are the popular selling coals. The cold weather which has prevailed for the past few weeks is still hanging on and the outlook for next week appears bright. Prices are unchanged since March 1.

A cold snap in Salt Lake City has stimulated consumer demand, but industrial buying is light. The slack situation is improving a little as a result of the better demand for prepared sizes. Slack prices are 25 cents higher than last week, mine prices being \$2 for screen slack and \$1.50 for straight slack. Other mine prices are: Lump, \$4; domestic lump, \$3.50; stove, \$3; nut, \$2.50; pea, \$1.75. Retail prices are \$8, \$7.50, \$7, \$6.50, \$6 and \$5, respectively.

Improved Tone in Cincinnati

A better tone is observable in the Cincinnati market. Less "consignment" coal is coming to the market and "distress" coal that had been cluttering things up for three weeks, is moving. Pocahontas producers have cut production to actual contractual demands plus a reasonable allowance for current sales, which is about one or two days a week. Low-volatile business has perked up noticeably, New River and off-grade shippers bringing their prices more on a line with the circular of "standard" companies. The high-volatile trade also shows improved tone, the "don't care" attitude being less in evidence. The volume of business is still far below normal. Specialized coals are quoted as follows: Block, \$3@3.50; egg, \$2.25@2.75. Retailers were greeted with a flock of small orders on the heels of a cold snap, but prices remain unchanged.

Trade at Columbus continues quiet and featureless. Buying is at a low ebb both for steam and domestic tonnage, although some attention is being given to railroad-fuel contracts. General contracting for steam tonnage is being held up to ascertain prices on railroad fuel and it is believed that some contracting will take place the latter part of the present month. Prices are still low and irregular although there is not nearly as much distress coal on the market and quotations are working toward stability. Demand for steam tonnage is not large, as many of the larger consumers still have considerable surplus. Domestic trade is quiet as it is between seasons and dealers are cleaning

up. Production in Ohio is lower than at any time in months. Little has been done in contracting for late shipments.

About 20 to 30 per cent of the mines in eastern Ohio already have closed or are closing, due to lack of orders and there is no indication that this heaviness will lift in the near future, as large consumers are well stocked. Especially is this true of the railroads, public utilities and large steel plants. Because of the abundance of fuel, negotiation of contracts is being deferred, and it is likely that the major portion of tonnage moving during the new coal year will be in the open market rather than upon a contract basis. Due to the lower production of prepared sizes, slack and nut and slack have become less abundant and prices have stiffened 10 to 15c. per ton as compared with a week ago.

The situation at Buffalo has not changed materially. The market is markedly dull and the outlook is for a continuance of this state of things.

Production in the Pittsburgh district continues to decline. The decrease in shipments of gas lump decreased the supply of gas slack offered in the spot market, which is now up 5c. from a week ago. Steam slack also is higher, owing to the practical disappearance of domestic coal shipments. The spot market continues dull.

New England Market Drags

In New England the steam coal market drags along in discouraging fashion. New low levels at Hampton Roads are the only new feature. There are no developments for all-rail. The industries complain of dull business; neither in shoes nor in textiles nor in machinery is there demand sufficient to absorb current production. The prospect is so uniformly drab that practically no buyers are in the market.

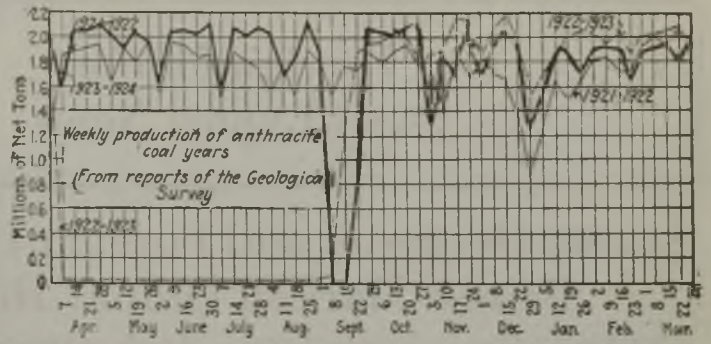
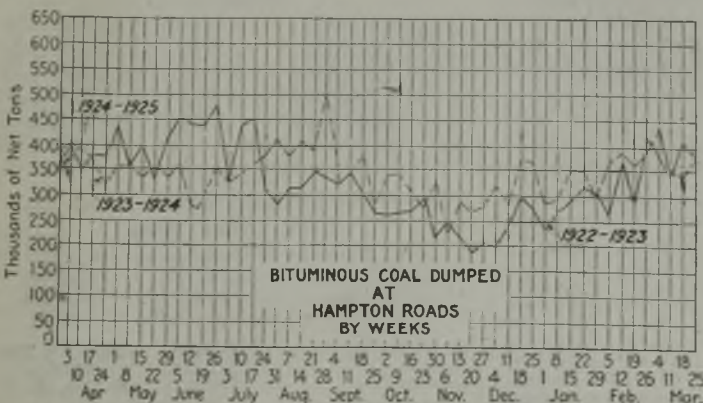
At Hampton Roads there are still heavy accumulations. The Western market is not particularly helpful and since operators seem disinclined to curtail there are likely to be further bargain sales at the Virginia terminals. A few sales of No. 1 Navy Standard Pocahontas and New River at \$4 flat have been rumored, but it is the impression of the trade that it would be difficult to pick up a cargo of any considerable size of really first-grade coal at less than \$4.15 per gross ton f.o.b. vessel.

On cars at Boston the quotations of the various factors are similarly depressed; \$5.50 per gross ton on cars has been an open price now for more than ten days, and there is a feeling among possible buyers that this figure will be materially shaded by certain of the agencies who have coal now en route for disposition inland from railroad wharves.

From central Pennsylvania all-rail there is likely to be decreasing movement, now that 1923 contracts have expired in so many instances. Neither via New York nor Philadelphia is coal being dumped in any volume worth mentioning. The differential in cost at seaboard operates so strongly in favor of Hampton Roads coals that April is certain to be a very light month for bituminous in Pennsylvania.

Seaboard Markets at Low Ebb

The coal trade at New York has settled down to a dull summer in the opinion of many coal men. Consumers are not showing any disposition to increase present stocks and operators are inclined to close more mines rather than operate at a loss. Complaint is current that considerable coal is now sold below the cost of production. Contract making is far below normal and demand in the spot market is at low ebb. Tidewater business is slow and there is some distress



coal in the New York harbor, but the tonnage is not large. Local houses are carefully watching the British situation, hopeful of obtaining some business if the miners go on strike. Quotations at Hampton Roads are off, but there is practically no foreign business being booked.

The ripple created at Philadelphia by the wage parley of the central Pennsylvania operators quickly melted away after the operators gave into the miners and adopted the union scale. Some shippers seemed to feel that the occasion warranted price increases, but it is doubtful if any considerable coal was sold at increased figures. Stockpiles continue to shrink and there is no indication that consumers will replace stock in the immediate future. Railroad buying also is quiet.

At Baltimore it is a "beggar's market," a case of survival of the fittest. The export outlook, however, is bright.

Prices are much better stabilized in West Virginia largely as a result of more limited production following a period during which coal was being literally thrown on the market. Even with production curtailed, demand is hardly equal to supply, but supply and demand are becoming more nearly equalized.

Market conditions at Birmingham show little change. Inquiry for spot steam coal is light and negotiation of contracts for industrial and railroad fuel has not assumed much proportions as yet. Reports indicate that producers of the better grades of domestic coal are comfortably sold up, in many instances for the entire year.

Anthracite Trade Dull Despite Price Cut

Reductions in the prices of domestic sizes of anthracite by the operating companies ranging from 40c. to 60c. on broken, egg, stove and chestnut coals and from 50c. to \$1.15 on pea coal failed to arouse any interest in New York so far as demand goes. There was no increase in movement, although retail dealers reported a fair volume of orders. Consumers show no anxiety about delivery although the present prices are for April only. Stocks in the retail yards are so large that consumers who ask for prompt delivery are easily accommodated. Independent operators, endeavoring to move their coals, often find it necessary to shade prices considerably in order to make shipments. Steam coals are moving in fair volume. Company reductions range from 35c. to 50c. on buckwheat and from 25c. to 50c. on rice. There was no cut in the price of barley, this remaining at \$1.50. A couple of the companies will make quotations only on application. A heavy snowfall on April 1 brought a busy week to Philadelphia dealers in delivering emergency orders, and on top of this they have received considerable business for cellar filling, yet the operators have fewer orders on their books now than in any spring for years. Though steam prices have been reduced, all shippers are finding difficulty to induce their contract trade to sign up. Retail prices at Baltimore have taken a tumble of between \$1 and \$1.25 per ton, the greatest drop in recent years in the history of the trade.

Car Loadings, Surpluses and Shortages

	Cars Loaded	
	All Cars	Coal Cars
Week ended March 22, 1924.....	908,651	161,149
Previous week.....	916,953	170,554
Same week in 1923.....	916,818	184,931

	Surplus Cars		Car Shortage
	All Cars	Coal Cars	
March 22, 1924.....	213,093	115,361	361
Previous week.....	175,002	88,479	604
Same date in 1923.....	12,741	4,111	75,993

Foreign Market And Export News

Strong Domestic and Foreign Demand in British Market; Output Higher

Pressure is strong for immediate supplies on the Welsh coal market, and all the collieries are heavily booked right up to the date when the strike is due. Buyers have been influenced by the rejection by the miners of the operators' offer, which is regarded as generous. Demand is strong from both domestic and foreign buyers.

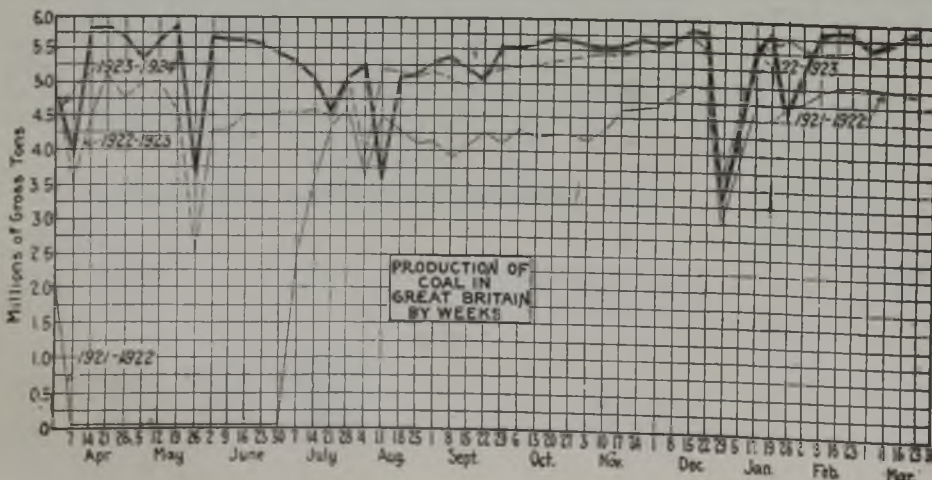
As a result of this pressure prices are rising strongly and many collieries are refusing new business until they have cleared off arrears occasioned by the rail and dock strikes. The impression is growing in some quarters, however, that the threatened strike will be averted, for some of the miners' associations are advising acceptance of the mine owners' proposals.

Loading congestion at South Wales is unabated, twenty-eight steamers awaiting berths although there is coal at the docks. The operators are trying to get the night loading shift at the docks reinstated to meet the rush for supplies, but with little success so far, the trimmers holding out for a 33½ per cent boost for the night shift.

The Newcastle market is firm for shipment up to April 15. Home demand is very strong but foreign buying has fallen off owing to the unsettled labor position, European exchanges and the dock strikes in Germany. British public-utility corporations are laying in heavy stocks against a miners' strike.

It is reported that Tyne has received a contract from the Paris, Lyons and Mediterranean Ry. for 400,000 tons of Durham coking coal, April-December loading. The French State Rys. also are seeking 60,000 tons for April-June delivery. A strike of Scottish coal trimmers is delaying Forth loadings. Rail deliveries to London are still badly congested.

Production by British collieries during the week ended March 22, a cable dispatch to *Coal Age* states, was 5,786,000 tons, according to the official reports. This compares with 5,778,000 tons in the week ended March 15.



Trade at Hampton Roads Dull But Hopeful

Dullness continues to mark the trade at Hampton Roads, with prices declining rapidly under distress orders, to save demurrage on large accumulations at tide. Export business has dropped slightly, while coastwise trade is barely holding its own. Bunkers show a slight gain.

Contracts are scarce, despite expectations that April 1 would bring large bookings. The tone of the market is rather weak, although the trade is optimistic, with a fair outlook.

Activities at the piers during March reflected a generally growing coal movement, under unfavorable conditions. The decline of the market was responsible for dullness here.

Industrial Demand Absorbs French Coal Output

Demand from industrial consumers in the French markets is ample to absorb the output. Trade in coal for household use, however, has eased up. The French collieries are receiving a large number of orders for replacement of purchases usually made abroad. Nevertheless, imports of British coals have been larger during recent weeks following the strikes in England.

Transportation has become easier during the week, due to an improvement in the supply of rolling stock.

Reparation deliveries to France and Luxemburg during the month of February were 332,700 tons of coal, 410,600 tons of coke and 65,000 tons of lignite briquets, a total of 808,700 tons, as compared with 775,900 tons in January and 584,000 tons in December. Deliveries to Belgium in February were 408,727 tons, including 53,587 tons of coke and 9,635 tons of lignite briquets.

The production of the Ruhr coal basin in February was 7,050,758 tons of coal (against 6,187,452 tons in Janu-

ary), including 6,371,451 tons for the occupied regions (as compared to 5,485,040 tons in January); 1,298,556 tons of coke (against 1,097,722 tons in January), a total for the occupied areas of 1,147,592 tons (against 881,910 tons in January). The results of the direct working of the mines and cokeries under Franco-Belgian administration are not included in the above figures.

Coal Imports by the United States During February

	1923	1924
Anthracite.....	101,820	25,410
Bituminous.....	384,142	46,362
Imported from:		
United Kingdom.....	190,455	4,095
Canada.....	157,631	42,267
Japan.....	8,240
Australia.....	16,784
Other countries.....	11,032
Coke.....	18,395	4,012

Export Clearances Week Ended April 5, 1924

FROM BALTIMORE		Tons
For Argentina:		
Gr. Str. Evelpis.....	4,601	
For France:		
Belg. Str. Danier.....	9,364	
For Italy:		
Br. Str. Betwa.....	4,537	
Ital. Str. Vincenzo Florio.....	9,249	

FROM HAMPTON ROADS

For Canada:		
Br. Str. Maraval for Georgetown.....	982	
For Newfoundland:		
Br. Schr. Anna MacDonald for St. Johns.....	307	
For France:		
Sw. Str. Sir Ernest Cassel.....	8,611	

FROM PHILADELPHIA

For Cuba:		
Nor. Str. Vendeggen for Havana.....	

Hampton Roads Pier Situation

N. & W. Piers, Lamberts Pt.:	March 27	April 3
Cars on hand.....	2,618	2,040
Tons on hand.....	164,269	118,498
Tons dumped for week.....	141,821	133,323
Tonnage waiting.....	20,000	12,100
Virginian Piers, Sewalls Pt.:		
Cars on hand.....	1,807	1,853
Tons on hand.....	122,750	128,850
Tons dumped for week.....	117,707	67,573
Tonnage waiting.....	208	2,200
C. & O. Piers, Newport News:		
Cars on hand.....	2,224	1,967
Tons on hand.....	111,870	99,190
Tons dumped for week.....	74,788	88,863
Tonnage waiting.....	4,150	5,025

Pier and Bunker Prices, Gross Tons

	PIERS	
	March 29	April 5†
Pool 9, New York.....	\$4.75@ \$5.00	\$4.75@ \$5.00
Pool 10, New York.....	4.50@ 4.75	4.50@ 4.75
Pool 11, New York.....	4.25@ 4.50	4.25@ 4.50
Pool 9, Philadelphia.....	4.80@ 5.20	4.80@ 5.20
Pool 10, Philadelphia.....	4.55@ 4.90	4.55@ 4.90
Pool 11, Philadelphia.....	4.35@ 4.65	4.35@ 4.65
Pool 1, Hamp. Roads.....	4.40	4.15@ 4.25
Pool 2, Hamp. Roads.....	4.20	3.85@ 4.00
Pools 5-6-7 Hamp. Rds.....	4.10	3.75@ 3.85
	BUNKERS	
Pool 9, New York.....	5.05@ 5.30	5.05@ 5.30
Pool 10, New York.....	4.80@ 5.05	4.80@ 5.05
Pool 11, New York.....	4.55@ 4.80	4.55@ 4.80
Pool 9, Philadelphia.....	5.10@ 5.55	5.10@ 5.55
Pool 10, Philadelphia.....	4.90@ 5.20	4.90@ 5.20
Pool 11, Philadelphia.....	4.65@ 5.00	4.65@ 5.00
Pool 1, Hamp. Roads.....	4.40	4.15@ 4.25
Pool 2, Hamp. Roads.....	4.20	3.85@ 4.00
Pools 5-6-7 Hamp. Rds.....	4.10	3.75@ 3.85

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

Quotations by Cable to <i>Coal Age</i>		
Cardiff:	March 29	April 5†
Admiralty, large.....	31s.6d.@ 32s.6d.	32s.@ 33s.
Steam smalls.....	22s.6d.@ 23s.6d.	22s.6d.
Newcastle:		
Best steams.....	26s.@ 26s.6d.	26s.6d.@ 27s.
Best gas.....	25s.@ 25s.6d.	25s.6d.
Best bunkers.....	24s.6d.	24s.6d.

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

News Items From Field and Trade

ALABAMA

George C. Randall, formerly manager of the southwest division of the American Railway Association, Dallas, Texas, has been appointed district manager of the association for the Southeastern division, according to announcement of M. J. Gormley, chairman. Mr. Randall succeeds S. H. Charles, who died recently.

ILLINOIS

The **Central Illinois Coal Traffic Bureau** has dissolved. It ceased to function April 1, when its office lease ran out in the Old Colony Building, Chicago. **W. A. Holley**, manager of the bureau for several years, is counting on enjoying a summer of ease for once in his life. **G. B. Hemphill**, who was assistant to the manager, has joined the Chicago Coal Merchants Association as traffic manager with offices in the Transportation Building.

The **West mine** broke its record again March 27, when 6,045.85 tons was hoisted in eight hours. The previous record was 6,020.25 tons made on Nov. 27, 1923. To make the record there were 1,239 hoists. No. 9 mine is known as West mine in Nokomis. Average tonnage for month of March was 5,742 tons per day. **F. W. Schneider** is mine manager at No. 9 mine, and **E. H. Hebenstreit** is superintendent of the company.

The **Franklin County Coal Co.**, formerly the Taylor Coal Co., has sold its retail department in Chicago to **Wright & Co.**, of Chicago. The Taylor retail division controlled a small dock and did a considerable business in steam coal for Chicago downtown buildings. Its manager, **R. H. Hatfield**, joins Wright & Co.

INDIANA

The **Sugar Valley Mining Corporation**, Terre Haute capitalized at \$50,000, has filed articles of incorporation with the Vigo County Recorder. This company will lease from the **Macksville Mining Company**, recently incorporated for \$500,000, the **Sugar Valley mine**, operated by the Sugar Valley Coal Co. before it went into the hands of a receiver. Directors of the new corporation are **John F. O'Brien**, **Joseph Mullikin**, **A. J. Beasley**, **Edwin H. Long** and **Arthur C. Boston**. Directors say the Macksville Co. and the newly incorporated company are the same, with the exception that the new organization has a few additional stockholders. Eventually, it is said, the Macksville Co. will dissolve.

Seventeen months of litigation in the federal court over the **Central Indiana R.R.**, known as the "Indiana Coal Road," ended recently when Judge **A. B. Anderson** entered a decree discharging **William Pirtle Herod** as receiver. The Central Indiana Railway Co. will operate the road. A fee of \$25,000 was allowed Herod for his services. The road is between Muncie and Brazil, and goes through the coal fields. The latest difficulties of the old Midland began when the **Central Union Trust Co.**, of New York, filed a complaint against it. It was ordered sold by Judge Anderson, but **Charles Martindale**, master in chancery, could find no buyer. The decree of sale was returned unexecuted. The new decree set out that all outstanding obligations had been cared for and mortgages had been satisfied. Herod was ordered to give up all property that he held as receiver to the Central Railway Co. The company assumed liability for all claims.

KANSAS

Kansas coal mines produced 4,650,479 tons in 1923, an increase of 1,132,236 tons over the output of the preceding year, according to the annual report of **James Sherwood**, who retired as state mine inspector on April 1 and was succeeded by **Leon Besson**. Crawford County deep mines produced 3,091,743 tons, or 67 per cent of the total; Crawford County strip mines 324,545 tons, or 7 per cent; Cherokee County deep mines 392,392 tons, or 8

per cent; Cherokee County strip mines 337,327 tons, or 7 per cent. The chief producers outside these principal fields of the state were **Leavenworth County**, with 137,563 tons, and **Osage County**, with 74,047 tons. The total number of men employed in mining was 10,459, an increase of 383 over the preceding year. The mines averaged 118 days' work, a decrease from 1922.

KENTUCKY

The **Columbus Mining Co.**, 332 Michigan Ave., Chicago, Ill., is contemplating doubling the size of its No. 5 mine at **Al-lais**, by opening two seams on the side of a hill across a valley from its present tipple. A long conveyor is to run up the slope, connecting the new operations with the old tipple. **Allen & Garcia**, of Chicago, are the engineers.

Federal Judge **A. M. J. Cochran**, Eastern Kentucky division, in a decision at **Frankfort**, on April 2, granted a temporary injunction to the **Liberty Coal & Coke Co.**, on **Straight Creek**, in **Bell County**, restraining members of **District No. 19**, **United Mine Workers**, from interfering with operation of the company's mines and with its employees. The judge has under advisement contempt proceedings against union miners charged with violation of a previous injunction.

A report from **Harlan, Ky.**, under date of March 31, stated that the **Henry Ford interests**, operators of the **Banner Fork mines** on **Wallins Creek**, were planning a million dollar water-power development to furnish power to Ford operations.

It is reported from **Whitesburg** that **W. J. Wray** and **Thomas Miller**, of **Northfork, W. Va.**, connected with the **Elkhorn-Hazard Coal Co.**, operating at **Sandlick**, were recently in **Whitesburg**, making arrangements for enlargement of the company operations, the concern planning expenditure of around \$100,000 in improvements. It was also reported that the **Reliance Coal Co.**, **Cincinnati**, is erecting sixty additional miners' homes at the **Glomawr plant**.

An imposing monument has been erected at **Jenkins** to the memory of **John G. Smyth**, former manager of the **Consolidation Coal Co.** and founder of the coal towns of **Burdine**, **Jenkins**, **McRoberts** and **Dunham**, who was killed by a slate fall in a mine at **Elswick** about eighteen months ago. The monument was erected in a public park through contributions from thousands of company workers.

Two hold-up men who looted the **Bank of Vicco**, **Perry County**, of a \$6,000 payroll of the **Knott Coal Corporation**, and \$8,000 of bank money, were captured a few miles from the town, riding the rods of a coal train. The country is so wild and passes are so few that there is not much opportunity for a thief to escape.

S. T. Ballard, of **Louisville**, official of the **Liberty Coal & Coke Co.**, of **Straight Creek**, who has been spending the winter at **Eau Gallie, Fla.**, was taken to **Jacksonville, Fla.**, for an emergency operation for appendicitis. He was in a dangerous condition, but is reported to be improving.

The **Louisville & Nashville R.R.** has placed some contracts for its own coal supply with mines on its lines. One **Louisville** concern stated that it had obtained eastern Kentucky contracts at around \$1.75 a ton, but understood that business had been placed at all the way from \$1.65 to \$1.90 a ton for mine run in eastern Kentucky, and that some business had been placed at from \$1.85@1.90 in western Kentucky.

MASSACHUSETTS

Sealed proposals for furnishing approximately 6,000 gross tons anthracite for use of the **Commonwealth of Massachusetts** in its various institutions will be received by the **Commission on Administration and Finance**, Room 315, State House, Boston, Mass., until 2 p.m., Monday, April 14, 1924, and then publicly opened and read. Copies of specifications and bidding sheet may be secured upon application to the commission.

NEW YORK

Shipment of coal contributed heavily toward the prosperity of the **Erie R.R.** in 1923. The increase of more than \$14,000,000 from this source and from the transportation of general merchandise was in a large measure responsible for the excellent results attained from operations in 1923, when net income after taxes and charges was \$8,435,272, as compared with a deficit of \$3,132,770 in 1922. After allowing for 4 per cent dividend requirements on the first and second preferred stocks, the company earned \$5.22 a share on \$112,481,900 common stock. The sole explanation for the increase in the item "Coal" was the fact that in 1923 the company's revenues were not affected by strike conditions like those in 1922. The income account for the year ended Dec. 31 last shows total operating revenues of \$132,978,455, as compared with \$106,874,103 in 1922. Operating expenses were \$108,070,145, as compared with \$100,101,523. After deducting sinking fund charges the company had a surplus of \$7,218,207 in 1923, as compared with a deficit of \$4,078,817 in 1922. Decrease of some \$3,000,000 in cash in the statement of assets on the company's balance sheets as of Dec. 31 last was more than made up by the decrease of more than \$6,000,000 in loans and bills payable. "Accounts and wages payable" decreased from \$17,081,700 in 1922 to \$15,357,309 in 1923.

The **American Coal Co.** for 1923 reports profits of \$1,112,691 against \$821,166 in 1922, after allowing for all operating expenses. After reserves for depreciation, depletion and other charges there was a balance of \$915,852, against \$639,765 in 1922. The 1923 balance was equal to \$18.46 a share on the 49,598 shares of \$25 par value capital stock before provisions for federal taxes, against \$12.90 a share in 1922.

The **Louisville & Nashville R.R.** in the year ended Dec. 31, shows net income of \$13,498,935 after taxes and charges, equal to \$11.53 a share on \$117,000,000 capital stock, against \$10,598,019, or \$14.72 a share on \$72,000,000 stock in 1922. Operating revenue was \$136,375,672, against \$121,138,840; operating expenses \$109,865,090, against \$99,604,496; dividends paid during the year increased to \$5,850,000, as compared with 5,040,000 in 1922. The company's surplus rose to \$7,427,833, against \$5,387,134 in the previous year.

OHIO

The **Shores-Allen Land & Fuel Co.**, **St. Clairsville**, has been incorporated with a capital of \$100,000 to mine and deal in coal and coke. A general jobbing and retail business also will be done. Incorporators are **Ethan E. Allan**, **Albert E. Clark**, **William Hickman**, **R. S. Fry** and **Louis M. Shores**.

Stockholders of the **Hocking Valley Railway Co.**, at their annual meeting recently at the **Spahr Building**, **Columbus**, elected the following directors: **O. P. Van Sweringen**, **Cleveland**; **M. J. Van Sweringen**, **Cleveland**; **W. J. Harahan**, **Richmond, Va.**; **J. J. Bernet**, **Cleveland**; **C. L. Bradley**, **Cleveland**; **W. A. Colston**, **Cleveland**; **Thomas J. Davis**, **Cincinnati**; **Parmely W. Herrick**, **Cleveland**; **F. R. Huntington**, **Columbus**; **Otto Miller**, **Cleveland**; **J. R. Nutt**, **Cleveland**; **Walter L. Ross**, **Toledo**, and **J. B. Zerbe**, **Cleveland**.

The **Mid-West Coal & Mining Co.** has opened an office in the **Union Trust Building**, **Cincinnati**, with **R. N. Osborne, Jr.**, as district manager and **H. K. Howard** as assistant. Mr. Osborne formerly was sales manager of the **Borderland Coal Sales Corporation**, and previously was with the **Smokeless Fuel Co.**, and the **Glen Alum Fuel Co.** Mr. Howard formerly was with the **Black Diamond Coal Co.** of **Cincinnati**, and for a short time was with the **Old Dominion Coal Corporation** as resident manager. **A. F. Dietrick** is the head and general manager of the **Mid-West company**, with general offices at **Cairo, Ill.**

The **Central Fuel Co.**, of **Cincinnati**, has liquidated, according to a statement issued by its president, **B. Lee Hutchinson**. The company was started during wartimes to do a jobbing business, but for the past two years has been handling mostly the output of the mines of Mr. Hutchinson and his brother. Negotiations are said to be pending by which these, which are in the **Logan County** and **Kanawha** fields, will be taken over by a large **Fairmount (W. Va.)** corporation. **James Hatch**, of the **Cincinnati** office, has joined the forces of the **Hutchinson coal company**.

After nearly three years, the final record has been filed in the closing of the business of the Peerless Coal Co. in Cincinnati with the filing of the report of Charles T. Greve, referee in bankruptcy. This shows that the total liabilities were \$20,873 with assets realized of \$9,381, hence the creditors received \$8,610, or 41½ per cent.

Pickands Mather & Co. announces the removal, March 31, of its offices from the Western Reserve Building to the twentieth floor of the Union Trust Building, Cleveland.

The Crown mine, Rose Farm, which had been idle for several months, has resumed operations giving employment to approximately 300 miners. Several large contracts have been obtained by the owners.

PENNSYLVANIA

Indications are that the strike at the Vinton Collieries, at Vintondale, will be prolonged for some time. District President John Brophy states that every man employed about the operations has joined the union, there being now 400 members in the Vintondale Local. From other sources this is denied. Evictions continue. Governor Gifford Pinchot has advised the evicted miners to resort to the courts to stop evictions, as, to his mind, the leases are perfectly legal. President Charles M. Schwerin, in reply to the Governor, said he could scarcely stop evictions now as the twenty families notified to vacate company property had already moved out. Mr. Schwerin declared that "when we find these occupants trouble makers, we feel that we are in the right when we ask them to leave, as we consider the homes the workers occupy just as much the property of the company as the mines, the pumps, fans or dynamos." Governor Pinchot notified company officials that he had sent a mediator into Vintondale to see what could be done to end the strike.

A \$46,000,000 program of hydroelectric development has been announced by the Penn Public System of the Pennsylvania Electric Corporation, which is erecting three dams and power stations as part of the program, on the Clarion River, in Clarion County. The plant is expected to be ready for operation by June. The project is known as the Piney Development. It was started in 1922 as the smaller of three projects on the Clarion which will cost \$28,000,000. The other part of the program takes in the Youghiogheny River in Garrett County, Md. There, 2,400 feet above sea level and "at the top" of the Alleghenies, the first of four dams and three power stations are under construction, at a cost of about \$18,000,000. According to officers of the corporation, each of the underlying companies is able to finance its developments through the sale of bonds and stocks. They include the Erie Lighting Co., Home Heating Co. (Erie), Warren Light & Power Co., Jefferson Electric Co., Du Bois Electric & Traction Co., Centre & Clearfield Railway Co., Johnstown Fuel Supply Co., Sykesville Electric Light, Heat & Power Co., Big Run Light, Heat & Power Co., Penelec Coal Corporation and the Venango Public Service Corporation group of nine others. Other participating corporations in the development of the system are the Clarion River Power Co., Eastern Land Corporation, Clarion Water Co., Youghiogheny Hydroelectric Corporation, Eastern Coal Corporation and the Penelec Water Co.

Thursday evening, April 24, has been set as the date for the banquet for the members of the Johnstown Mining Institute. State Geologist George H. Ashley, of Harrisburg, has been invited to deliver an address. Charles O'Neil, of Altoona, secretary of the Central Pennsylvania Coal Producer's Association, also will speak. Five hundred are expected to attend.

An analysis of the causes of accidents that, during the past five years, have cost Pennsylvania's mining industry the labor represented by approximately 16,000 men employed steadily through that period—80,145 man-years—has just been completed by the Coal Mine Section of the Pennsylvania Compensation Rating and Inspection Bureau. The analysis, comprising more than fifty tables and charts prepared under the direction of Rush N. Hosler, superintendent of the section, covers Pennsylvania's mine-accident experience during the seven years from Jan. 1, 1916, the time when the Pennsylvania workmen's compensation law went into effect. During this period there were 3,620 fatalities in the anthracite field and 3,003 fatalities in the bituminous regions of the state. The analysis covers these as well as the non-

fatal casualties. Contrary to the popular belief, the analysis shows, explosions in the mines are not the cause of the greatest number of accidents. Falls of rock and roof rank first among the causes of injury and death to the mine workers. Haulage accidents come second. The miner killed at his work leaves an average family of three children, and the average age of each dependent child is six years and thirty-four weeks.

Thomas Elliott, of Brownsville, president of the Lilley Coal & Coke Co., of West Brownsville, is making an extended tour of Europe. He will be away for several months.

A state charter has been issued to the Red Top Coal Co., Indian Head, with a capital stock of \$50,000. The purpose of the company is to acquire coal and coal lands and their operation. The incorporators are Ralph P. Barnard, 1420 New York Avenue, N. W., Washington, D. C., treasurer; Charles S. Harper, Philadelphia and George N. Ault, Ridley Park.

TEXAS

For the year ended Dec. 31, 1923, the Texas & Pacific Coal & Oil Co. reports a net loss of \$279,238 after depreciation, depletion, amortization and inventory adjustments. This compares with a net income of \$2,077,736, after depreciation, but before depletion, amortization, etc., in the previous year. After the payment of dividends there was a deficit of \$701,520, as compared with a surplus of \$1,233,175 for 1922. The gross earnings for the year were \$5,625,306, as compared with \$7,316,287 for 1922.

UTAH

The U. S. Fuel Co., of Salt Lake City, has contracted with Roberts & Schaefer for the complete installation of new steel tipples and screenings bins at East Hiawatha.

Nels R. Erickson, formerly general sales manager of the Premier Coal Co., has been appointed to a similar position with the Rock Springs Coal Co., of Ogden. Mr. Erickson has been in the coal business since 1912.

VIRGINIA

The State of Virginia has awarded a contract for 25,000 tons of New River pool No. 1 coal to the Lake & Export Coal Co., to be delivered over the Chesapeake & Ohio at \$1.95 net tons at mines. A contract for 35,000 tons of Pocahontas pool No. 1 was awarded to the Virginia Smokeless Coal Co., to be delivered over the Norfolk & Western at \$2.10.

The City of Norfolk has awarded a contract for 9,000 tons of navy standard Pocahontas coal to the Smokeless Fuel Co., at \$2.25.

WASHINGTON

Foreseeing less oil fuel competition with the decline of California oil production, the Pacific Coast Coal Co. is now developing two new mines near Seattle. One is the new Newcastle mine, now getting into its stride, and the other is to be called the Indian mine, at the village of Indian, in the Cedar River valley. This mine is expected to attain a production of 1,000 tons a day by Sept. 1. These mines are to replace the old Newcastle mine and the old Black Diamond mine, both of which are approaching exhaustion.

WEST VIRGINIA

The Thomas & Wilson Coal Co. will commence the development of coal territory on Cabin Creek in the Kanawha field in the near future, having leased about 515 acres on the west side of Cabin Creek from the Ohley Coal Co., subject to the rights of way of the Chesapeake & Ohio Ry. and the Virginian Power Co. and the surface rights of the Don Coal Co. The company is headed by John Oldroyd, of Upshur County. The lease runs for a period of 20 years, dating from March 6 and gives the Thomas & Wilson Co. the exclusive right to mine coal, make coke on the premises and to erect any necessary buildings. The lessee is to pay a royalty of 7c. a net ton except when coal is down to \$2 a ton or less, when a royalty of 5c. a ton is to be paid. From June 1, 1924, to Sept. 1, 1924, the minimum royalty payment is to be \$100 a month whether that much coal is mined or not, and thereafter \$2,400 a year whether the amount of coal mined would yield that sum annually or not.

The annual report of the West Virginia Department of Mines for the year ending June 30, 1923, just submitted to Governor E. F. Morgan, shows that 81,136,729 gross tons of coal and 823,912 net tons of coke was shipped over the railroads from West Virginia mines. Shipments by river totaled 1,097,277 tons, 925,830 tons of which originated on and was floated down the Great Kanawha and 171,447 tons was shipped on the Ohio River. This does not include the tonnage consumed by water craft and local river trade. There was no coal shipped on the Monongahela River and no coke was shipped either on the Kanawha, Monongahela or Ohio rivers during the year. The report of the department shows that during the year the average wage received by pick miners throughout the state for mining run of mine coal was 97c., which was an increase of 2c. over the price paid in 1922. Each pick miner produced an average of 1,237 tons, an increase of 126 tons over the fiscal year 1922. The average annual wage of pick miners (all pick miners included) was \$1,199.89, an increase of \$144.44 over that of 1922. The average selling price of coal shipped from the mines of the state was \$3.18 per gross ton, run of mine coal, an increase of 63c. a ton over that for 1922. Coke was sold f.o.b. at the ovens at an average price of \$7.14 per net ton, an increase over the previous fiscal year of \$1.28 per ton.

The Diamond Coal Co., of Fairmont is building a new steel Marcus tippie at Riversville.

WASHINGTON, D. C.

The U. S. Civil Service Commission announces an open competitive examination for Junior Engineer, mining, to fill vacancies in various branches of the government service at an entrance salary of \$1,860 a year. The examination will be held throughout the country on May 7. Full information and application blanks may be obtained from the U. S. Civil Service Commission, Washington, D. C., or the secretary of the board of U. S. Civil Service examiners at the post office or custom house in any city.

CANADA

A resolution calling upon the government to initiate a policy which would give to the Dominion an all-British and Canadian coal supply, was moved in the House at Ottawa March 31 by T. L. Church, Conservative member for North Toronto. Mr. Church's motion asked that a duty be placed on coal from the United States so as "to insure an all-British supply for Canada, and thus afford adequate protection to coal mined and coked under the British flag."

The Maritime Coal Co., operating mines at Joggins, for many years, has negotiated an agreement with the company's employees. The agreement is the same as that rejected by the miners of the British Empire Steel Corporation. The indications are that the miners of the Maritime company, while continuing with the United Mine Workers will refuse to recognize the Communist majority in the district who have repudiated the agreement.

The River Hebert pits will resume operations within the next few months, according to indication. A company is being formed to take over the mines, and all that is now necessary is to effect a wage and conditions agreement with the miners. The prospects are that the same agreement rejected by the miners in the district, by majority vote will be acceptable to the River Hebert miners. Indications are also that the miners employed in the Springhill mines will accept the so-called Barrett agreement. The Springhill miners are known to be out of sympathy with the Communist majority in the United Mine Workers and took no part whatever in the elaborate reception to J. B. McLachlan on his release from prison.

The Saunders Ridge Coal Co., Ltd., with head office at Calgary, Alberta, has been granted Dominion incorporation with an authorized capital of \$1,500,000.

The Liverpool Chamber of Commerce announces the formation of a company, including Sir Alfred Mond and representatives of other Welsh colliery interests, to install a complete breaking plant in Montreal to handle Welsh anthracite of the sizes required by Canadian trade. The plant will be ready to deal with shipments at the opening of this year's navigation season. In the first year the Welsh coal interests are expected to ship a minimum of 100,000 tons of anthracite to Canada.

Traffic News

C. & O. Buys Three Short Lines

The American Rolling Mill Co. announced the sale, April 1, to the Chesapeake & Ohio R.R. of the Ashland Coal & Iron Ry., a forty-mile road extending from Ashland to Seaton, Ky. The deal was said to involve approximately \$4,100,000 and was described as "cash." The deal was consummated in Cleveland, Ohio, by the Van Sweringen interests, which control the Chesapeake & Ohio.

Purchase of the Long Fork branch of the Baltimore & Ohio Railroad and the Miller's Creek line, both connecting with the Big Sandy division of the Chesapeake & Ohio Ry. was announced March 21 by the Chesapeake & Ohio. Both lines tap some of rich coal fields of Kentucky. The Long Fork line is about twenty-five miles long, and in its operation the Baltimore & Ohio was obliged to make use of the Chesapeake & Ohio's tracks from Martin to its own main line. The Miller's Creek road is little more than four miles in length, but it opened into fields which, on account of their geographical location, were regarded as belonging to Chesapeake & Ohio territory. The Chesapeake & Ohio, it is understood, has sought for several years to acquire these two lines. The purchase price was not made public.

Association Activities

Delegates attending the twentieth annual convention of the **Canadian Retail Coal Association**, in Toronto, on April 4 and 5, gave consideration to the problem of Alberta coal. The coal men pointed out a number of obstacles to economical distribution of Alberta coal in Eastern markets. Freight rates as arranged by the president of the Canadian National Rys. are prohibitive, and as the coal will not stand storing in the open air there is a problem of providing storage space and other facilities which would have to be faced. A crayon talk on "Coke and Its Manufacture" was given by F. E. Lucas, B.A., specialist of the Dominion Coal Co., and Major Charles B. Staats, director of the National Association, dealt with some of the problems and aims of the parent organization. The following officers were elected for the ensuing year: President, W. H. Smith, Owen Sound; Vice-President, F. A. Dunlop, Hamilton; Secretary-Treasurer, Bert Caspell, Brantford; directors, M. F. Cray, Guelph; T. E. Pratt, Peterboro; Fred Mann, Brantford; J. C. Fowlds, Oshawa; F. H. Marlatt, St. Thomas; G. F. Rogers, St. Catharines, and J. A. McLean, Wingham. A model of the Loree breaker, owned by the Hudson Coal Co., attracted considerable attention. C. D. Winter was in charge and in explaining its operation pointed out some of the problems of the mine operators.

Industrial Notes

S. A. Emery, former Eastern manager of the Dodge Manufacturing Co., has joined the sales force of the **Royersford Foundry & Machine Co.**, Philadelphia, Pa. He will sell the entire Royersford line, including Sells and Royersford bearings, hangers, couplings, collars and other transmission equipment. He joined the company March 1.

The **Semet Solvay Co.**, of Syracuse, N. Y., has contracted with the **Roberts & Schaefer Co.** for pneumatic dry cleaning tables for cleaning coke breeze at their Detroit operation.

Obituary

Charles Herr, proprietor of the Lackawanna Coal Co., in the city of Lackawanna, adjoining Buffalo, died in hospital on April 1, from injuries received from a falling coal conveyor in his yard. He was president of the Lackawanna Chamber of Commerce and otherwise prominent in business affairs. He was 53 years old and left a wife and eleven children.

W. C. Mullan, superintendent of the Continental No. 1 mine of the H. C. Frick Coke Co., at Uniontown, Pa., died at his home there on the afternoon of March 24. He was 70 years of age. Mr. Mullan was a native of Bradford, Pa., and at one time he was considered among the applicants for president of the Frick company. He was well known in mining circles in northern West Virginia, especially among those having connections with the coke belt. Burial was at Mount Pleasant, Pa., on Thursday, March 28.

Spencer H. Rhoads, auditor of the Rochester & Pittsburgh Coal & Iron Co., died at his home in Indiana, Pa., on March 28 of heart disease. His death was sudden, as he had attended to business during the day. He leaves a wife and daughter.

Howard Vernon McCardell, Cresson, Cambria County, Pa., coal operator, died at his home there on April 1 from burns received in a gas explosion in one of his mines on March 11. He was the son of Mr. and Mrs. James B. McCardell, of Cresson, and is survived by his wife, his parents and two brothers and a sister.

Stephen B. Jones, 69, of Chicago, father of Homer D. Jones, recent president of the National Retail Coal Merchants' Association, and for years in the retail coal business in Chicago, died March 23 at his home after a nervous breakdown.

Coming Meetings

American Welding Society. Annual meeting, April 22-24, Engineering Societies Building, 33 West 39th St., New York City. Secretary, W. M. Kelly, 33 West 39th St., New York City.

National Exposition of Coal Mining Equipment and Machinery of the American Mining Congress, May 12-17, Cincinnati, in conjunction with the annual meeting of the National Coal Association.

West Virginia Coal Association. Annual meeting May 13-17, Cincinnati, Ohio. Secretary, W. H. Cunningham, First National Bank Building, Huntington, W. Va.

National Coal Association. Annual meeting, May 14-16, Cincinnati, Ohio. Executive Secretary, H. L. Gandy, Southern Building, Washington, D. C.

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.

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

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

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

American Society for Testing Materials. Annual meeting, Chalfonte Hotel, Atlantic City, N. J., June 23-27. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

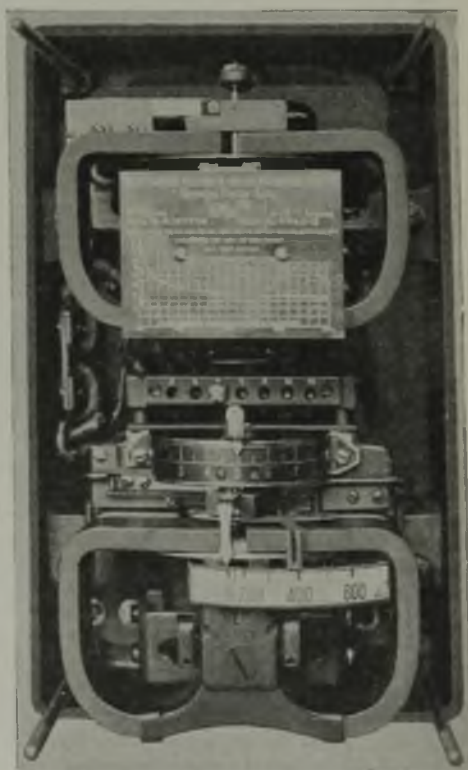
New Equipment

Current Relay Equipped with Self-Contained Ammeter

A line of overcurrent and directional relays equipped with a current-indicating element has just been developed by the Westinghouse Electric and Manufacturing Co. These relays differ from the standard CO and CR, overcurrent and directional relays respectively, in that they have self-contained ammeters which give a continuous indication of the current flowing in the circuit. They are designed for use where the relays are mounted on the front of a switchboard and where there is insufficient room to provide separate ammeters.

In addition to operating as protective relays, they indicate the current flowing through the circuit, thus showing that the relay is receiving current through its circuit and is in condition to operate if a short-circuit should occur.

The indicating element of this new relay consists of a thin copper disk mounted on a separate shaft and having its own jewel bearing and control spring. It is actuated, however, by the same flux which operates the main disk to close the contacts of the relay. This prevents the indicating element from operating when there is any trouble either inside or outside the relay that would prevent the main electro-magnet from being energized. This meter and



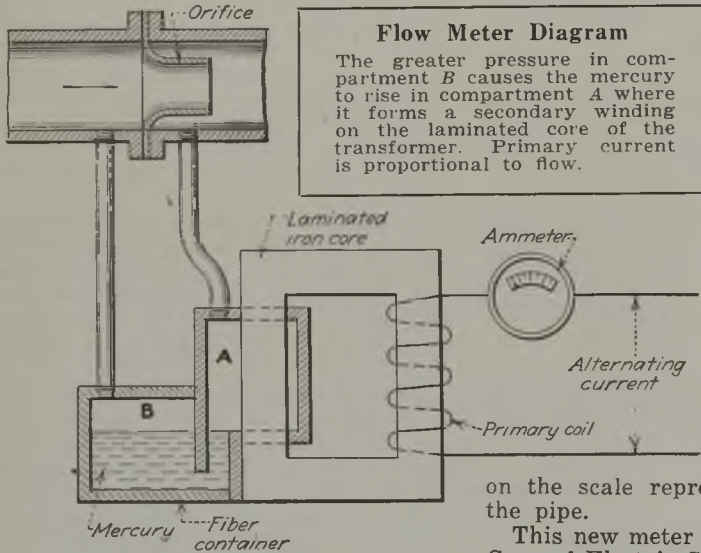
Directional Current Relay with Ammeter

Aside from protecting the circuit against any possible overload, this new relay gives a direct indication of the current in the circuit. This makes it relatively easy to set the relay for the proper current overload.

relay gives a visual indication of load variations and will show how the load builds up on the circuit.

Flow Meter Functions by Transformer Principle

A new type of electrically operated flow meter which works on the principle of an alternating-current transformer has been recently developed. This meter can be made indicating, recording or integrating to measure the flow of gas or liquid through a pipe. Owing to the electrical principle of operation the instruments can be placed



any distance away from the pipe line through which the flow is being metered.

The electrical element is a transformer with a primary winding which is connected to a source of alternating current of constant potential. Without any secondary load on the transformer, the only current flowing in the primary winding is that to magnetize the core and supply the losses in the core and coil. If a properly calibrated ammeter is connected in the circuit as shown, it will indicate this current.

On the secondary leg of the core is a fiber container made in two compartments—one, A, that surrounds the core, and another, B, that contains mercury but is in communication with compartment A. These compartments are connected on the opposite sides of an orifice in the pipe line through which the fluid or gas flows. With no flow in the pipe line the pressure in A and B will be the same, and the mercury is at a height so as to be at a level with the bottom of A. When there is a flow in the pipe line, a difference in pressure is created across the orifice, so that the pressure in A will be lower than in B, resulting in mercury being caused to rise into A to a height that will equalize the pressure between the two chambers. When the mercury rises in chamber A, it surrounds the laminated core and forms a short-circuited secondary winding of one turn.

This ring of mercury around the core is similar to a copper ring, except that it has a higher resistance for a given cross-section. In the mercury around the core a current will be induced just as in a closed secondary

winding on a transformer. To supply this secondary current an increased current must flow in the primary which will be indicated on the ammeter.

The difference between the two currents will be a measure of the fluid flowing in the pipe line, as the height of the mercury in chamber A is a measure of the quantity. The current flowing in the mercury ring will be in direct proportion to its height. That is, a ring $\frac{1}{2}$ in. deep will have one half the current flowing in it that a ring $\frac{1}{4}$ in. deep would have, as the former has twice the resistance of the latter. Increasing the current in the secondary would cause proportional increase in

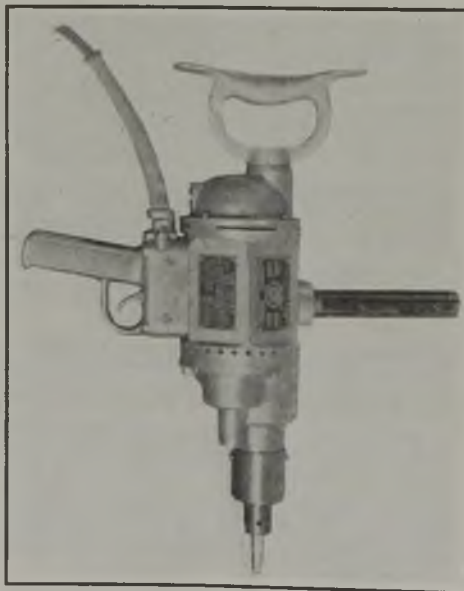
the primary current. The ammeter could be made to indicate the quantity of fluid directly by adjusting it so that with no flow in the pipe line, its needle would point to zero. Then calibrate it so that, as the mercury rises in chamber A, the increased current flow in the primary will cause the needle to point to divisions

on the scale representing the flow in the pipe.

This new meter is the product of the General Electric Co. and is not intended to supersede the mechanically operated flow meter of this company.

Electric Screwdriver and Socket Wrench

Quantity production methods demand the very latest designs in portable electric tools and their substitution wherever possible for the much slower and more costly hand operations. The



Motor-Operated Screwdriver and Wrench

Shop and repair work will be greatly facilitated by the use of this new machine, which is light in weight and easily controlled. Note the pistol grip and trigger switch, which greatly facilitates handling.

Black & Decker Manufacturing Co., Towson Heights, Baltimore, Md., announces a No. 3 portable electric screwdriver and socket wrench for heavy-duty production work. This tool, which weighs only 15 lb., has been designed particularly for driving very large wood screws, lag screws, and running up nuts on large bolts. The spindle is equipped with a positive clutch which automatically disengages when the forward pressure on the tool is released. The patented pistol grip and trigger switch is standard equipment. A universal motor furnishes the power and can be supplied for all standard voltages up to 250.

Instrument for Measuring Insulation Resistance

A new testing device known as the Junior Megohmer has recently been developed by Herman H. Sticht & Co., 15 Park Row, New York. Like other models of this kind made by the same company it combines a megohm-meter with a voltmeter. The instrument is one of the smallest of its kind, and is especially suitable where relative values of resistance are of more importance than very accurate measurements. It is a convenient instrument for inspectors because of its light weight.

The measuring system consists of a small but high grade D'Arsonval galvanometer, with a double scale gradu-



Testing Instrument with Megohm-meter and Voltmeter

This instrument is suitable for making high-resistance insulation tests. It is complete in that it has its own generator and is provided with a voltmeter and a scale for measuring resistance in megohms.

ated 0-20 megohms and 0-120 volts. Four binding posts are provided, thus giving the instrument two voltmeter ranges, 0-120 and 0-240 volts, in addition to the megohm scale. Operating instructions are mounted in the cover of the instrument and are always visible to the operator when the instrument is in use. A hand operated magneto-generator furnishes 110-volt pulsating direct current which serves as a source of potential for insulation measurements.