COAL AGE

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

SYDNEY A. HALE, *Editor*

New York, July, 1933

No Dissent

HOWEVER MUCH sectional interests divide opinion on the recent decision of the Interstate Commerce Commission outlawing intrastate reductions in Ohio coal rates, coal men everywhere can applaud Commissioner Eastman when, comparing the economic plights of the railroad and the coal industries, he declares that "an outstanding difference is that reductions have been avoided to a much greater extent in the case of freight rates on coal than in the case of mine prices for coal." The competitive battle in which both industries have a common stake has been fought by the coal operator with altogether too little assistance from the railroad. True, particularly in the Middle West, there has been a growing disposition to join hands in combating the inroads of natural gas, but much more must be done if coal and railroads are to recover lost markets.

In Tenebris

AT LAST, the eyesight of miners is receiving attention. More study should be accorded to this subject. C. W. Owings, at the recent National Safety Council Congress, recorded that, of 6,676 men in a metal-mining district, 48.6 per cent had normal, or 20/20 vision, in one or both eyes; 20.27 per cent had 20/30 vision; 14.96 per cent, 20/40 vision; and the remainder, 14.09 per cent, 20/50 to 20/400 vision. Of 570 men who had been injured in cases where it was believed improper illumination was involved, 60.8 per cent had subnormal vision, as compared with 51.4 per cent for the district. This means that the subnormal men had 46.7 per cent more accidents of this sort than they would have had if they had been possessed of normal vision.

Of the 570 injured, 92 were injured from two to six times each in accidents in which it might be held that illumination was involved. Of this group, men with 20/20 to 20/40 vision were injured an average of 2.4 times, whereas those having 20/50 to 20/400 vision were injured an average of three times.

Mr. Owings' data are extremely valuable in estimating the risks to men with uncorrected vision. However, without any knowledge of optometry, it would seem that miners whose need for vision in the mines is limited to ten feet or less should not be tested for wider ranges. As far as the correction of miners' sight at their work is concerned, there is little interest in the larger ranges of acuity. In view, however, of poor lighting, light absorption and dust, it would be difficult off-hand to decide what the distance should be under more normal conditions. Some people have night blindness and would be less able to see in the dark than others, which would suggest further modifications of the test. Perhaps, therefore, the investigations into the acuity of miners' vision should be made under mining conditions.

Wanted: Unity

PROPOSALS to govern the conduct of the bituminous coal industry under the National Industrial Recovery Act by separate, independent codes for each producing district or regional group have met with a cool reception in Washington. The administration readily admits that the differences between the anthracite and the bituminous branches of the coal-mining industry are such that separate codes are necessary and advisable. When it comes to soft coal, however, a single code for the entire bituminous mining industry is the goal of General Johnson and his staff.

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From the standpoint of the National Recovery Administration, this desire for an all-embracing code is readily understandable. Despite the contrary decision reached at the meeting of operators in Chicago last month, such a solution would seem best also from the standpoint of the coal industry. No one knows better than the men engaged in that industry what steps are necessary to promote stabilization; no one knows better than these same men what should be the fair measure of differential competitive relationships. To say that these men will not or cannot work out their problems in a spirit of cooperation but must be coerced into agreement would be paying a poor tribute to leadership in the bituminous industry.

As a practical matter, it is obvious that the administration at Washington could or would pass upon no single district code without some knowledge of what other districts proposed in the all-important questions of minimum wages and maximum hours. These major desiderata of the new law cannot be escaped or evaded by any procedural twisting. How much better, then, for the industry to come forward with a common, unified plan (which, incidentally, no more implies a uniform wage scale or universal acceptance of unionization for all districts than did the textile code) than to appear before the Washington administration as separate, warring groups with no common aim but interdistrict destruction?

The Second Battle of Trenton

TRENTON, scene of General Washington's famous holiday surprise attack of 1776 which infused new life and spirit into the fight for American independence, is today the battleground for an organized effort to use modern heating equipment in a war to recover lost domestic tonnage for hard coal. As narrated in the June issue (p. 195), retail coal merchants in that New Jersey city some time ago pooled interests in a joint equipment sales agency with a Main Street front. Their latest and most spectacular exploit, launched in May, is directed to the recapture of the hot-water-heating load from gas.

Selling of heating equipment by individual coal retailers is not new. In many cases, however, the individual dealer has neither the background of experience nor the facilities to capitalize adequately the possibilities presented. Market limitations and competitive jealousies also curtail the field for profitable operation. By organizing, as the Trenton group did with the cooperation of the Anthracite Institute, a joint agency in which all dealers have an ownership interest, these drawbacks disappear and the retail coal business of the community acquires a new merchandising force and standing. What Trenton has done other communities can duplicate if producers and distributors are alive to their opportunities.

Fly-Ash Problems

GREATER use of stokers, forced draft, fine and pulverized coal will eventually bring prominently before the public the question of collecting fly ash. Ultimately the problem will affect even the domestic consumer, though for a while he may escape, because of his limited finances, his vote and the lesser volume of his fly ash, especially as he is not burning pulverized coal. Concurrently will come a drive on the improper use of oil, which has been the worst source of air pollution. This will put consumers of all kinds of fuel, except gas, under regulation.

In view of the imminence of such regulation, the objectionableness of fly ash being under discussion in many cities and actively under study by the College of Physicians and the Franklin Institute, in Philadelphia, coal men should become interested, so that they may direct such regulation in a manner that will not be unduly burdensome and destructive of their legitimate interests. It should also be possible to discover some ways in which use may be made of the fly ash collected, which appears to be of a character somewhat different from flue dust and ashpit waste, as its color would indicate, the differentiation being greater doubtless with low air pressures and higher chimneys.

Fly ash has been used as filler for fertilizer, paint and asphalt; for road surfacing, cinder blocks, mold-dusting powder, and hard-surface brick. It can be made into the last of these by chemical treatment without burning, and metallic oxides can be used to give the product any desired color. This brick has no real refractory value but can be used for the outside of boiler settings and for interior and exterior building walls.

WEAK AND HEAVY TOP

+ Make Longwall and Mechanization Imperative in Nova Scotia

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NOVA SCOTIA has four principal coal fields—Cumberland, Pictou, Inverness and Sydney—but the last of these is more important than the other three, as it produces 75 per cent of the entire output of the province. Though, in general, this article deals with that field only, the methods described obtain also in the other three areas.

The coal seams of the Sydney field, which form part of the Lower Carboniferous measures, outcrop on the northeastern coast of Cape Breton Island for about 30 miles and dip northeastwardly under the sea. Geologic thrusts from the southeast and northwest have formed three synclinal basins, the limbs of which slope from 7 to 40 per cent, though the true dip is approximately 7 per cent, and in the present workings 27 per cent is the maximum gradient. The sea bottom dips about 2 per cent in the same direction, so that the solid cover over the coal increases 5 ft. in every 100 ft. traversed.

Three seams are now being worked at respective intervals of 450 and 160 ft.; but in a stratigraphic depth of 4,000 ft., eleven seams, 3 to 7 ft. thick, have been found. The field is remarkably free from faults. Present development has proved an area of approximately 100 square miles, and as yet no indication of a limit to the extent of the field has been noted.

The coal is bituminous, of high-volatile, medium-sulphur and low-ash content and is suitable for metallurgical, steam-raising and gas-making purposes. Normal production is at the rate of 5,000,000 tons yearly. Recoverable coal within 5 miles of the shore line is estimated at over 1½ billion tons.

Land operations today are confined to the lowest of the three working seams, more than 80 per cent of the entire output coming from submarine areas, present workings extending to points three miles from the shore and under covers ranging from 200 to 1,600 ft. The predominant roof is a weak shale, which becomes even weaker as development is carried seaward. The floor varies from fireclay to shale.

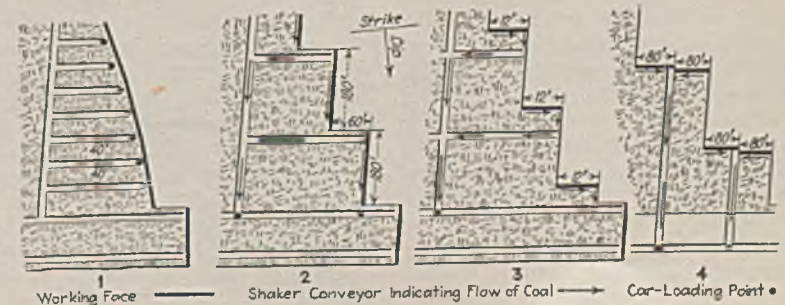
Until quite recently, all the coal under land areas was mined by rooms, followed by pillar extraction. After the seams entered submarine areas, room working still continued, 56 per cent of the coal being left in place to support the sea bottom. This practice was followed until sufficient cover had been attained to permit complete recovery without fear of inundation of workings, not only in the seams now being mined but in those also that might later be operated. This depth of cover ranges from 700 to 1,200 ft., about 100 ft. of solid cover per foot of coal now being, or later to be, taken out within that depth.

At the lesser covers, the pillars were successfully removed, but as depth increased to 1,100 or 1,200 ft. it was found almost impossible physically, and quite impossible economically, to keep places open when driven in the solid. A change in method, therefore, became necessary, and, in 1923, longwall advancing was undertaken. Today, 45 per cent of the output is mined by longwall, and this percentage will continue to increase.

Longwall is not, of necessity, a more economical method of extraction than pillar-and-room where pillars are drawn, but, under conditions and covers such as now obtain in this field, it is the only successful method of operation. It lends itself much more readily to mechanization, especially in this field, where, because of the weak top, rooms cannot be driven more than 20 ft. wide and must be timbered closely right up to the face. It affords opportunity of winning the maximum tonnage from a given area in a given time and is in itself the first step in intensive mining, as all the coal is extracted on first working. To do this in a limited time, mechanical operation is necessary.

In the five years immediately prior to 1923, much progress was made in the mechanization of haulage, cutting and pumping. The animal haulage used in subsidiary roads was entirely replaced by mechanical haulage, air-operated at first but now becoming increasingly electrical; main pumping stations and main-haulage and hoisting engines were electrified, and today many such auxili-

Fig. 1—Stowed-Type Longwall System as First Used; Horse Haulage From Face to Gate. Fig. 2—Stepped Longwall Face With Caving; Shaker Conveyors Along Face, Laterals and Main Gate. Fig. 3—Short Face Driven Up Pitch; Shaker Conveyors Along Face, Down Dip, in Laterals and Main Gate. Fig. 4—Gates With Two 80-ft. Faces; Shaker Conveyors Along Face and in Gates.



ary installations are similarly equipped. Trolley locomotives have been in operation since 1924.

Unfortunately, the coal is weak and friable, and, the mines being gassy, they are troubled with both dust and gas, making it necessary to use caution in the introduction of electricity. With rock-dusting and adequate ventilation, both under strict supervision, the danger from coal dust and gas has been reduced. Thus far, only one colliery uses electricity at the face, but in time electrical operation is sure to become more general. All electric installations are in fresh-air splits. Hoists and pumps are operated at voltages from 550 to 2,200, but mining machines at 250 volts. Two of the hoists are of 1,200 and 1,325 rated horsepower respectively. So far as I know, these are the largest underground installations in the world. The construction of the housing rooms, roughly 25x35x25 ft., in measures such as heretofore described, necessitated the use of 20-in. I-beams running 142 lb. per linear foot for beams and columns. To support the roof over these hoisting stations was in itself no small feat.

With longwall came the cutting of the coal by chain machines and transportation by shaker conveyors, and later belts. Today, every operation, except loading, is thoroughly mechanized. Though much study has been given to machine loading—the final step in the program of complete mechanization—the heavy, weak shale roof demands such close timbering as to preclude the use of loading machines, all of which require some clearance, however moderate. Experiments have been made with drag-scrapers and with a self-loading conveyor, similar to the McCarty Duckbill. Neither has proved successful from an economical standpoint, but it is hoped that, with further experimentation, this self-loading conveyor, which now feeds itself into the coal automatically, will develop a limited field of usefulness. Certain governmental regulations render it extremely difficult to take advantage of the mechanical loader.

The first longwall operation of 1923—a true longwall operation on the advance—was undertaken in a 5-ft. seam at a depth of 1,520 ft. below sea level with 1,430 ft. of overburden. A breasting 100 ft. long on a 7 per cent dip and rise was started along the strike, and two gob roads were constructed to serve as haulage level and intake airway. A main gate was started off the haulage level and from this the longwall face was developed (see Fig. 1). Mining was by hand pick, and the coal was drawn in cars by horses from the face to the gate through roads parallel to the level, spaced on 40-ft. centers. This face reached an ultimate length of 1,600 ft. It proved successful, making possible the more economical winning of the coal, affording safer working conditions, reducing maintenance charges and giving coal of better size than could be obtained by room-and-pillar methods.

The next step—the introduction of machine mining and face conveying—was first attempted on an advancing face in a 5 ft. 2 in. seam pitching at 20 per cent, the cover being just over 1,000 ft. A headway off the level was brushed and constructed as a gate, and from this four 180-ft. faces were laid off, that nearest the level leading by about 60 ft., the others being stepped a like distance. Only two of the four 180-ft. faces are shown in the illustration (Fig. 2). The coal, undercut by air-operated chain machines, was hand-loaded on shaker conveyors along the face and delivered from the first wall directly to cars on the haulage level, but, from the other walls to lateral conveyors, which in turn delivered to the main gate conveyor (all of the jig type), and thence to cars on the level.

The first operation was, as stated, true advancing longwall. The material from a heavy brushing of the many gob roads on only 40-ft. centers was used as stowage, almost completely filling the waste. With conveyors along the face the need for these roads was obviated, and the lack of stowage material resulted in the change from the stowed type to the caving system of longwall. Hardwood chocks, 2 ft. square and of 6-in. timber, were used to protect the face, and softwood pack lines, 12 ft. wide on 60-ft. centers and stone-filled with material drawn from the waste, allowed the overburden to settle easily over the rest of the area. The hardwood chocks were set in two rows parallel to the face, the rows being on 7-ft. and the chocks on 8-ft. centers. While the face row of chocks was being built the rear line was withdrawn and the roof allowed to cave behind.

In this instance, the foregoing method was not entirely successful, due partly to the inexperience of the miners and partly to the fact that the roof consisted of from 2 to 12 ft. of shale with a 25-ft. band of sandstone immediately overlying it, a condition thus far peculiar to this section of the field, but one which led to the development of the third method.

The shale broke readily, but sometimes the sandstone remained unbroken for a while. Occasional rigid supports, negligently left in the waste by miners who did not at first appreciate the importance of removing them, undoubtedly accentuated the tendency of the sandstone to resist breakage, and when the break did occur it rode over the chock line and closed the face.

In regaining a wall after one such closure, a breast about 12 ft. wide was carried up the rise, the face being on the cleavage plane of the coal. It was noticed that, if the coal were sheared in the tight corner, it would slab off the face even when it had not been undercut.

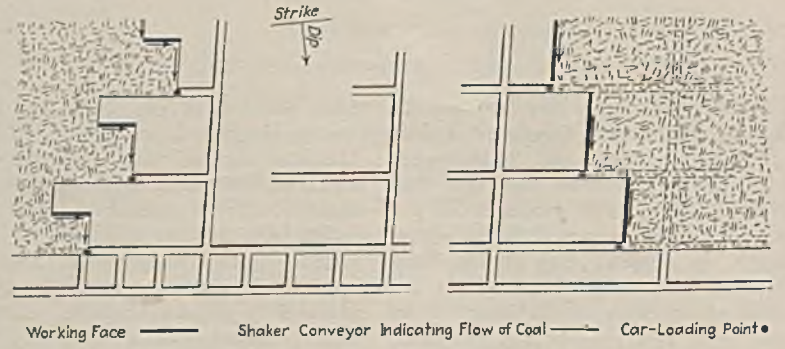


Fig. 5—Short Faces Driven Up Pitch; Shaker Conveyors Along Face and Down Dip to Mine Car.

Fig. 6—Stepped Pitching Faces Advancing Along Strike; Shaker Conveyors Down Face to Lateral.

This led to the conversion of this section to the layout shown as Fig. 3, which is self-explanatory. From this was evolved the system illustrated in Fig. 4, practically a duplication of that last mentioned, but having two 80-ft. faces tributary to one main gate conveyor and eliminating lateral conveyors. This latter was found to be altogether desirable, as it had been proved that when the shaker conveyor was laid practically on the level in a gob road, subject to heave, its capacity was fully 60 per cent less than when operating on the dip, nor could it handle all the coal mined at the face.

Brushing on gates averaged about 4 ft.; and on main roads 6 ft. had to be taken down. To avoid this and the construction of gob roads, systems shown as Fig. 5 were developed. This is really sectionally retreating longwall while development is on the advance. Where depth of cover permits narrow-work development and maintenance at an economical figure, this method is still in use.

All the aforementioned caving systems are now operated in this field. To concentrate the output from the several faces of the one longwall section and obviate the need for more than one car-loading point and its constant shifting—objectionable features if all faces

were to be worked on the same shift—belt conveyors were installed on the main haulage levels, which would receive the coal from the faces and load it into the cars at one point.

This installation was first tried on a level having ordinarily two loading points—that is, No. 1 wall and the mother-gate. The loading point at the gate was, of course, fixed temporarily until a second gate had been constructed, but that from the leading wall advanced by the depth of the undercut (4½ ft.) every working shift. Earlier the companion airway which parallels the level had been discontinued, the ventilation being taken through the haulage level, thence along the walls and released to the main returns through airways constructed in the gob. This had obviated the use of cars to take coal through slants from the low (or intake) airway, but as the brushing in the roadway had to be carried 6 ft. high, it was still necessary to extract coal for 40 ft. below the haulageway in order to afford stowage space for the brushed rock and protection from concentrated roof shear at the low rib of the level. Along this short downhill face was made our first experiment with the use of a flat-belt face conveyor to deliver coal to the main belt.

In the delivery of coal to the belt much coal at first was spilled and, though the belt was troughed, some also was spilled in travel. Spillage plates placed at the receiving points of the oncoming coal overcame the first difficulty. Large lumps of coal, not centrally placed on the belt, which collided with the idlers and were tilted over the side, were the cause of spillage in travel.

Spillage occurred also on the flat face belt. Much of this was attributed to the loaders throwing the coal too far in loading it onto the belt, carelessness which could be remedied, but it also was shown that with a natural gradient of 20 per cent, and with the additional inclination needed to elevate the delivery end above the main belt in a length of but 40 ft., the gradient of the belt was too steep for successful operation, as the coal tended to roll downhill. It was decided, therefore, to reequip this wall, now that the inherent possibilities had been clearly demonstrated.

The wall itself was 250 ft. long, advancing along the strike in a seam pitching at 20 per cent, the coal being 6 ft. thick. Two walls were now brought in line to give a continuous face of 500 ft. The present installation was designed and supplied by Mavor & Coulson, in conjunction with the operating engineers. The main belt is 30 in. wide and will have an ultimate length of 1,800 ft. It is of the troughed type and is operated by a 25-hp. air turbine at a speed of 200 ft. per minute, which can be increased to 250 by a resetting of the motor governor.

The face conveyors consist of shaking

Fig. 7—Rope-Connected Shaker Conveyor.

pans in three units, each operated by a double-acting 17-in. reciprocating air engine. The pans of the first and second units are 23 in. wide and 6½ in. deep, but, to provide for the increased load on the lower section, those of the third unit are 26 in. wide and 8 in. deep. The original pans were in 10-ft. lengths and bolt-connected. To save weight in the moving of the pans and to facilitate passing them through chock lines, their length has been reduced to 7 ft., and the bolt connections have been replaced by two wire ropes which, being threaded through adjacent lugs of successive pans on each side of the conveyor line and tightened by Sylvester jacks, connect the lugs by a friction lock and effectually unify the conveyor pans. Engine drives also, at first single-acting and side-connected to the pans, have now been standardized and are double-acting and direct-connected underneath the conveyor, one engine operating up to 300 ft. of conveyor, depending on load and gradient conditions.

The 40-ft. face to the dip is equipped with a drag-chain conveyor delivering, at the same point as the shakers, to the receiving end of what is styled a telescopic loader. This is really a 60-ft. belt mounted on wheels. Its frame is of such height as to permit of its delivery end being telescoped (hence the name) over the inbye end of the main belt, the maximum superimposed length being 30 ft. As a consequence, the main belt need not be extended until the face has advanced that distance instead of for every cut, as was formerly necessary.

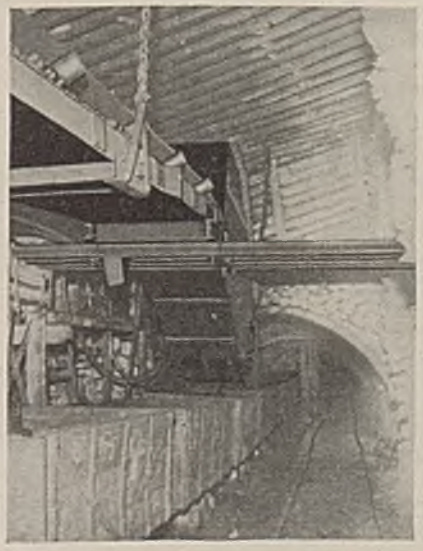
This loader is largely responsible for the success of the whole operation. Though its receiving end is kept right at the face on the loading shift, when the roadway is being brushed on the following shift, the loader may be moved back, thus facilitating ripping and road construction. It operates in direct line with the main belt, which it overlaps, and consequently delivers its coal in the same direction in which the belt is moving. This not only places the coal centrally on the belt and so avoids spillage but permits the belt to be more fully loaded.

Another important feature is the receiving hopper into which the belt discharges and from which the mine cars are loaded. The empty trip is hauled inbye this bin and returned through a turnout directly underneath the belt and hopper, which is fitted with an air-operated movable bottom, by means of which the flow of coal to the cars may be interrupted as the trip passes under the loading point, thus avoiding spillage between cars which would otherwise occur. This unit regularly produces 690 tons per shift from a 500-ft. face with 29 men loading—that is, at the rate of 24 tons per loader.

The undercut has gradually been deepened from 4½ to 6½ ft., a Samson air-operated chain machine cutting on one shift, the chocks being drawn, the coal face drilled and the pans moved during the next shift, with shooting and loading on the third.

Every step in the operation must be coordinated. The face has reached a length of 500 ft., and it is not improbable that this will be definitely lengthened. The belt can handle a greater load, but whether this will be obtained eventually from a deeper cut or from an increased face (and possibly a lessened undercut) is now being determined. No one feature can be allowed to evolve to its maximum without all others being kept "in phase." Depth of undercut, ease of roof control, length of face, adequate scavenging of the gas, rapidity of advance, spacing of the main-haulage arteries, as well as the actual capacity of the installation, are all interdependent and evolution must be toward a maximum and economical whole rather than toward emphasizing any one constituent part.

Fig. 8—Delivery End of Main Belt; Receiving Hopper and Trip Being Loaded.



BUCKEYE RIVER TIPPLE

+ Has High Loading Rate Over Wide Range Of Water Levels

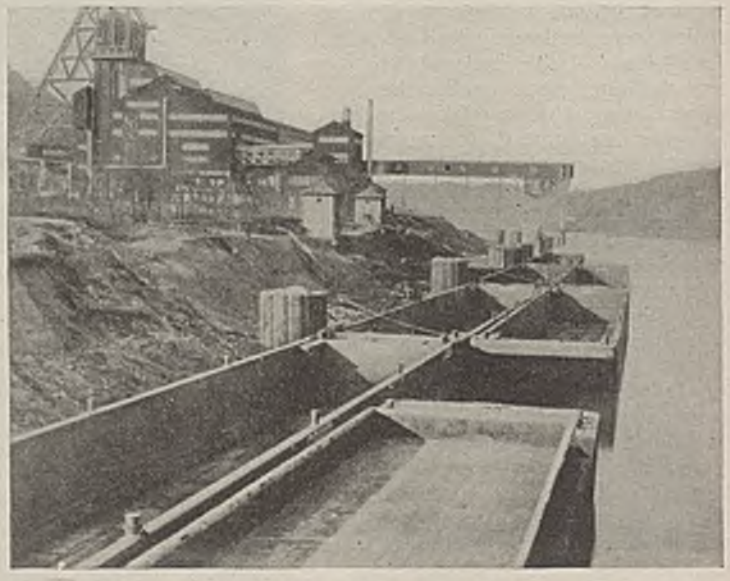


Fig. 1—Nemacolin Harbor and Barge-Loading Plant From the Upstream Ice Breakers

EARLY Sunday morning, Nov. 13, 1932, six barges loaded with 4,975 tons of washed coking coal left the Nemacolin plant of the Buckeye Coal Co., a subsidiary of the Youngstown Sheet & Tube Co., for the new river transfer plant of the Pittsburgh & Lake Erie R.R., at Colona, Pa. With this shipment, the new river tipple of the Buckeye Coal Co. was officially baptized, and the transportation of coal to the Mahoning Valley partly by water was resumed after a lapse of 70 years.

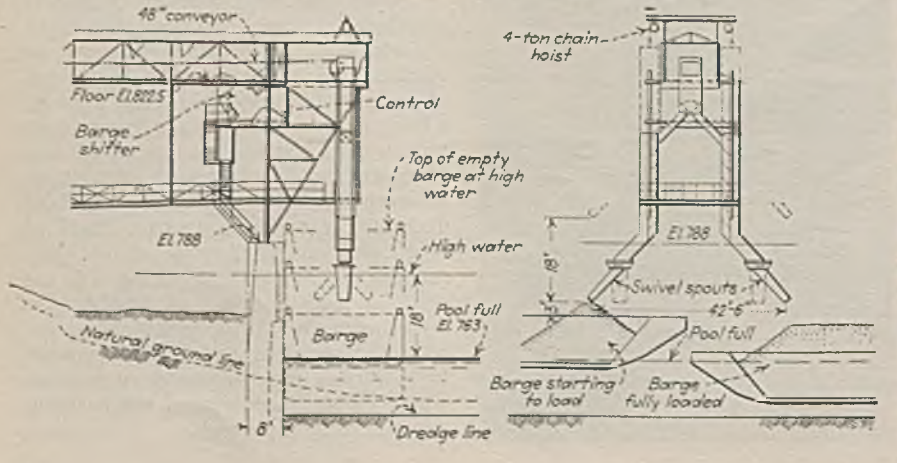
This and subsequent shipments were made possible by the construction of the transfer plant at Colona and the filing of a rail tariff of 83c. per ton from that point to Youngstown by the Pittsburgh & Lake Erie. Use of the joint river-rail route to Youngstown is expected to save about 25c. per ton on coal from the Nemacolin mine. The present all-rail rate is $1.48, while the cost of river-rail transportation is set at $1.25, divided as follows: towing charge, 30c.; transfer charge, 12c.; freight to Youngstown, 83c.

The new barge loading plant at Nemacolin represents the Buckeye Coal Co.'s part in the provision of facilities to make joint river-rail shipments possible. With a tipple capable of loading barges at the rate of 625 tons per hour, which is the rate at which washed coal is turned out by the cleaning plant, and a harbor accommodating eighteen empty and eighteen loaded barges, the plant is the largest and most modern on the western Pennsylvania river system.

Aside from the harbor itself, the Nemacolin loading plant consists of a conveyor trestle from the washing plant to the barge loading station on the bank of the Monongahela River, and the loading station proper, including the barge shifter. The trestle is 220 ft. long, and the floor level at the river end is 59½ ft. above the full pool level. A 48-in. rubber belt was installed above the floor, with the tail pulley located in the washing plant. Chutes and gates in the washery are arranged to permit loading the washed coal into railroad cars on the tracks beneath the plant or onto the belt conveyor for transportation to the barge loading station. The conveyor is driven by a 30-hp. motor through a tandem drive located in the heat-drying plant alongside the trestle between the washery and the river.

The barge loading station consists of two telescoping lowering chutes, a flygate, the motor-operated barge shifter and the necessary piers and supporting structure. Two lowering chutes were installed to avoid shutting down the washery, with attendant effects on efficiency, in case there should be any delay in moving a barge into position at the loading point. By means of the flygate, the operative can divert the coal into either chute at his option. Each chute is equipped with a 4-ton chain hoist for adjusting the height of the outlet in accordance with changes in the pool level. With this arrangement, it is possible to load barges during all intermediate water levels between full pool level and 18 ft. above. Swivel discharge chutes on the lower ends of the

Fig. 2—Arrangement of Equipment in Barge-Loading Plant



lowering chutes insure even distribution of the coal in the barges.

Barges are handled in the harbor by a shifter designed and built by the Link-Belt Co. This shifter is mounted just below the floor level of the trestle to get it above any possible flood stage, as the river has been known to rise 35 ft. above the full pool level. One unusual feature of the shifter, which is shown in Fig. 3, is the use of regenerative counter torque braking for retarding the barges. Two drums are provided, each of which can be rotated independently of the other to make quick adjustments for various lengths of barges.

Each drum also is individually powered to accelerate two loaded barges when lashed together against the current velocity at the maximum loading stage, and by means of regenerative braking, each drum also can be used independently to retard two barges against the maximum current velocity. Furthermore, regenerative braking serves to keep both the pulling and trailing ropes automatically tight at all times without attention from the operative. The arrangement of the ropes and sheaves for controlling the barges is shown in Fig. 3. Solid lines show one position of the barge; dotted lines, the other. Ropes are attached to the outside corners of the barges to make them hug the harbor line.

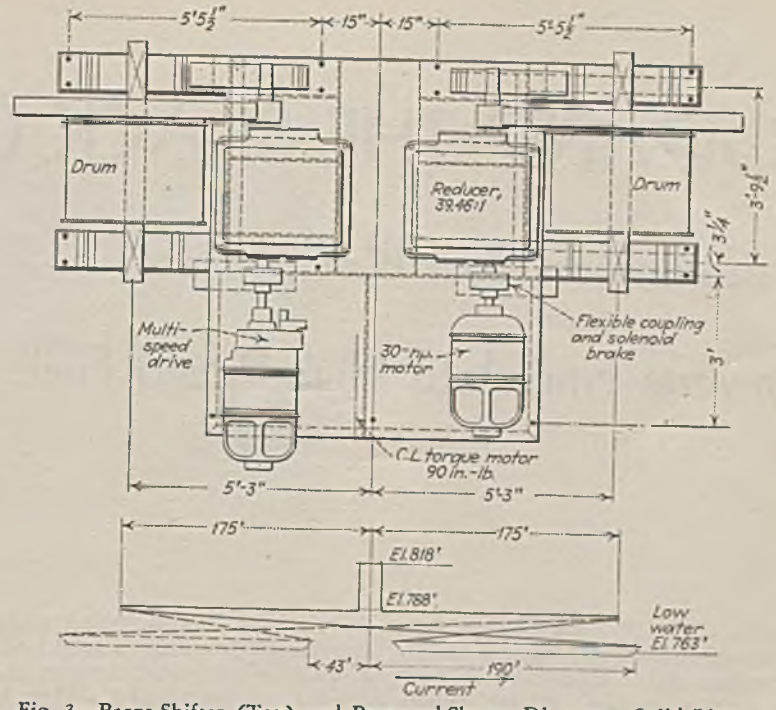


Fig. 3—Barge-Shifter (Top) and Rope-and-Sheave Diagram. Solid Lines Show One Position of Barge; Dotted Lines, the Other

All electrical equipment in the plant is operated from pushbutton control boards in the barge loading station. These controls are interlocked with those in the washery to enable the operative to signal and, if necessary, shut down the latter. The controls of the barge shifter, however, are not included in the interlock, for obvious reasons.

Harbor improvements included the ice breakers, mooring piers, the barge harbor line above and below the loading station, a pier for the washery water supply intake, and the supporting pier for the trestle. The plan of the harbor is shown in Fig. 4. Total length of the harbor from the ice breakers to the last downstream pier is slightly over 750 ft. Capacity of the harbor, in accordance with general river practice, is eighteen empty and eighteen loaded barges, the capacity of each barge averaging 900 tons.

With the exception of the ice breakers, which are similar to those at the Colona harbor mentioned above, the Nemacolin harbor is entirely different from any other in the region. In general, the other harbors employ timber piling or monolithic concrete. As the solid rock comes up very close to the surface at Nemacolin, the maximum penetration that might be expected with wood piles was only 7 to 8 ft., which experience on that part of the river has demonstrated to be insufficient. Consequently, the usual construction is based on concrete down to the solid rock, admittedly a more expensive method.

With the double purpose of insuring structural stability and reducing construction cost, Nemacolin officials turned to interlocking sheet-steel piling. As the surface of the rock proved to be more or less soft and disintegrated, it was found that the steel piling could be driven in sufficiently to prevent sliding, while filling the circular and rectangular forms with sand gave the requisite stability.

The only experimental consideration of any moment in this construction is the effect of the river water on the piling, due to the presence of acid in the mine water draining into the river. However, steel pilings used in bridge foundations at Pittsburgh have lasted twenty years without appreciable corrosion. These pilings, though, were entirely submerged, and time will reveal whether or not the alternate submersion and exposure to air will result in excessive corrosion at Nemacolin.

The final step at Nemacolin consisted of dredging the harbor to a depth of 12 ft., the spoil being deposited back of the harbor line. One feature of the construction work was the speed with which it was completed. The harbor contract was let to the Dravo Contracting Co. on Sept. 2, 1932, while the contract for the steel structure (conveyor trestle and harbor tipple) was let to the Koppers Construction Co. on Sept. 8. The first shipment, as stated above, left the plant on the morning of Nov. 13.

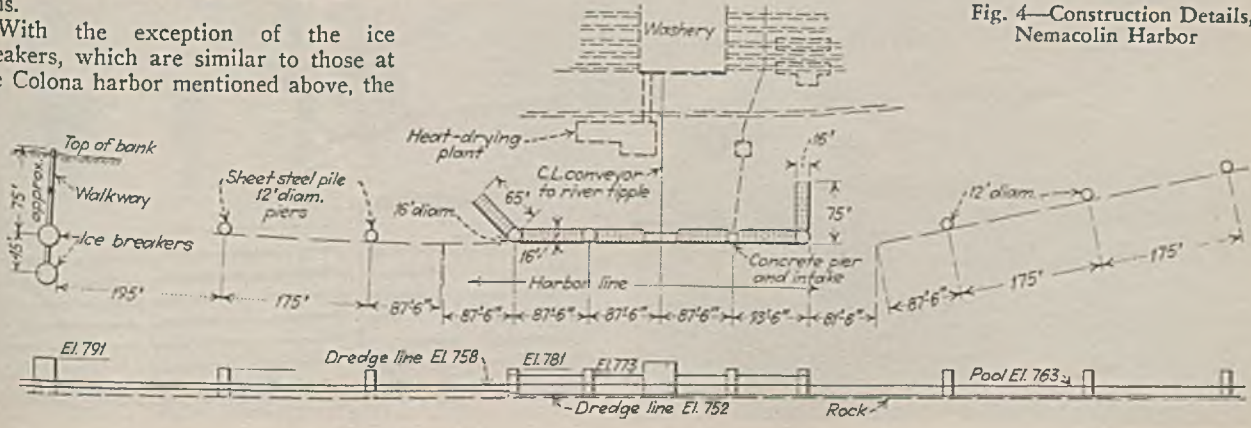


Fig. 4—Construction Details, Nemacolin Harbor

SOLVING THE SLACK QUESTION—

+ Covington Coal Block Plant

Converts Fines Into High-Priced Fuel

By ROBERT L. BEARD
General Manager, Tahona Coal Co.
Fort Smith, Ark.

PROFITABLE slack disposal is a problem which has engaged the attention of the bituminous industry for a number of years. As yet, definite solutions to the problem of disposing of this size at a fair price in unstable or difficult markets have been few, though an increasing number of companies are turning to briquetting as one of the most feasible methods of converting slack into a fuel commanding a relatively stable market and prices comparable with those for prepared sizes. One company in this list is the Covington Coal Co., Tahona, Okla., which started the production of a fuel manufactured from semi-anthracite slack in 1931.

In common with many other companies, the Covington organization has built up its business through strict preparation, supplemented by year-to-year refinements to meet and anticipate the demands of the consumer. One result of these refinements has been an increase in slack output in late years. This led the company and its sales affiliate, the Tahona Coal Co., Fort Smith, Ark., to investigate the possibilities of manufactured fuel as a means of absorbing the slack production, which otherwise represented practically a total loss. As a result of this investigation, it was decided to install the "Kleen-Blox" system developed by the Kleen-Blox Engineering Co. and now handled through the Roberts & Schaefer Co.

The Covington plant went into full operation in September, 1931, and results in the succeeding months were entirely satisfactory. During the present season (1932-33), it has been necessary to double-shift the plant to satisfy the demand for product, which is marketed under the trade name "Tahona-Blox."

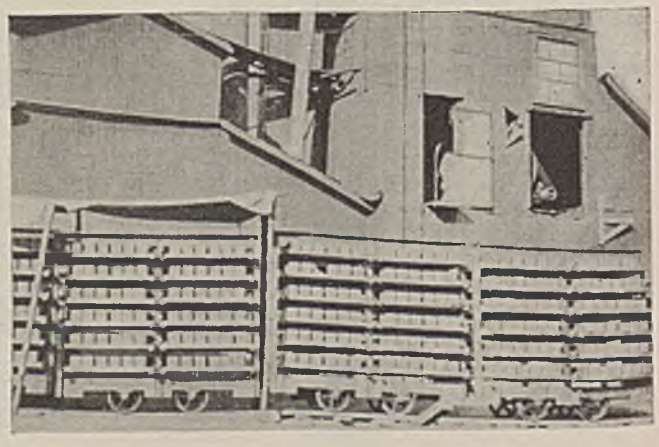
Slack used in the manufacture of the 5x5x4-in. blocks is taken from the screening and preparation plant to a storage hopper in the blocking plant by belt conveyors. From the storage hopper, measured quantities of slack are discharged onto a parallel-flow dryer. This dryer is 40 ft. long with the furnace at the high end, and the coal and heated air travel together to the discharge point. In the course of the trip through the dryer, surface moisture is removed and the slack is heated to the proper temperature for further treatment. From the dryer, the slack is elevated to a hot-coal storage hopper located over the mixer and Kleen-Blox press.

Mixing of the slack and binder takes place in batches of 3,000 lb., which are weighed out by a batch weigher and dumped into a 60-cu.ft. batch mixer equipped with a two-blade agitator. The proper percentage of binder is added, and mixing goes on until each particle is coated with a thin film. The binder itself is a petroleum product made from an asphalt-base oil. Quick cooling and hardening are features of the binder, which results in a dense, lustrous block.

When mixing is completed, the separate batches are dumped into a hopper feeding the Kleen-Blox press. From this hopper, measured quantities are distributed to twelve molds in the machine. Heavy tamps, each weighing 500 lb., then drop into the molds, compressing the mix into hard, dense blocks, which are stripped from the molds and placed on pallets, each pallet holding twelve blocks. These pallets travel forward on

Surface Plant of the Covington Coal Co., Tahona, Okla. The Blocking Plant Is at the Right.

"Tahona-Blox" Loaded on Cooling Cars for Transportation to the Railroad Loading Station.



"Tahona-Blox" as They Appear in the Car.

a roller conveyor to cooling cars made up of racks mounted on mine-car trucks. Each car holds 2 tons of blocks. Pallets are loaded by hand, and when the cars are filled to capacity they drift down the track to the loading boom. While making this trip, the blocks cool and harden sufficiently to permit immediate loading.

The Covington plant is equipped for loading blocks into either gondolas or box cars. The empty cooling cars travel around a loop back to the Kleen-Blox plant, where the pallets are removed and sent to the front of the press by gravity while the cars move on to the loading station.

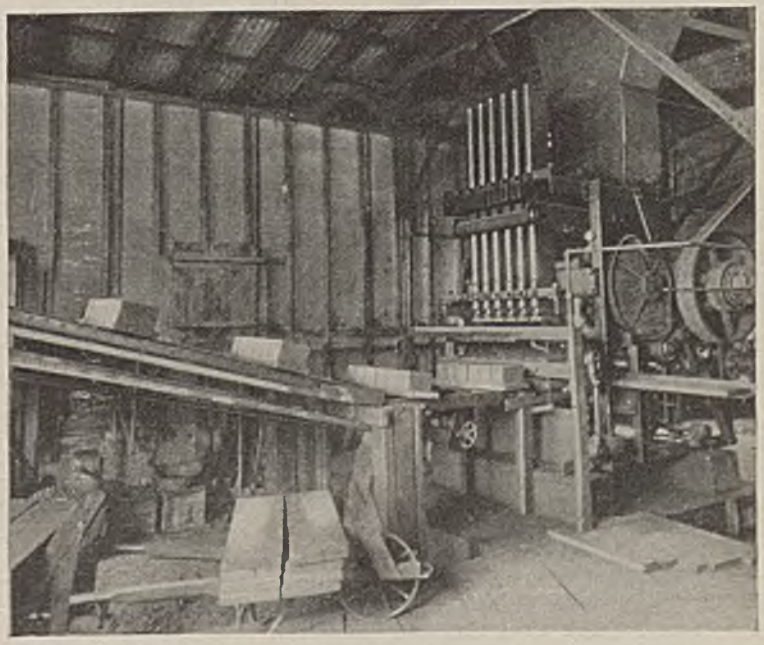
Capacity of the Covington Kleen-Blox plant is 15 tons per hour, and the operating crew consists of five men, as follows: one dryer man, who looks after the dryer and boiler and oversees the general operation of the entire plant; one mixer man; one press operator; and two loaders, who place the pallets in the racks on the cooling cars. The whole operation of manufacturing and loading the blocks is a continuous flow from the preparation plant to the railroad loading station.

Tahona-Blox are sold at a premium over the regular prepared sizes produced by the company, due largely to the fact that the dealer receives a 100-per cent salable product. Breakage, even when shipped 800-900 miles, is negligible, while in most cars of prepared sizes of coal degradation is a major factor, especially if the coal is shipped any distance. This breakage represents a direct loss, especially to dealers in small towns, where there is no opportunity for disposing of the slack, and this loss is enlarged where there is a growing demand for semi-anthracite coal.

In addition to solving the slack problem, experience has shown that Kleen-Blox coal is finding favor with dealers for three reasons: (1) blocks can be stored indefinitely in the open, inasmuch as they are waterproof and unaffected by rain or snow; (2) the blocks are clean and dustless, and require no further treatment before delivery. Furthermore, they can be piled in a neat stack in the basement, and their light weight (3½ lb.) eliminates the back-breaking job of shoveling coal into the furnace, usually left to the housewife; and (3) they burn evenly with little ash and smoke. A furnace filled with Tahona-Blox needs no attention from day to day except for the addition of a few blocks night and morning to keep the house at an even temperature.

During the present season, and in spite of two-shift operation, the plant has been unable to supply the demand for the blocks, due to the fact that available supplies of slack have been insufficient. Tahona-Blox move to Minneapolis, Minn.; North and South Dakota, Iowa, Nebraska, Kansas and Missouri to the north, and to Houston, Texas; New Orleans, La., and other points to the south of the mine, which is 30 miles south of Fort Smith, Ark. One of the outstanding features of the Tahona-Blox program was the fact that no educational efforts were necessary to insure acceptance of the product in the trade. Original plans called for mixing the blocks into the prepared coal, but this was soon abandoned when dealers came into the market for carload lots.

Six-Unit "Kleen-Blox" Press at the Glenn Smith Fuel Co. Plant, Council Bluffs, Iowa. The Covington Press Makes Twelve Blocks in One Operation, Using Divided Molds.



BITUMINOUS INDUSTRY

+ Charts Path to Stabilization

At Chicago Meeting

Charles E. Bockus

KEENLY conscious of the many problems facing them after three years of industrial depression prefaced by ten years of declining prices and growth in competitive fuels and sources of energy, bituminous coal operators of the country earnestly sought for some solution for the resulting disorganization of distribution and marketing practices, and for a satisfactory basis of cooperation under the National Industrial Recovery Act, at the fourteenth annual meeting of the National Coal Association, held at the Drake Hotel, Chicago, June 15-17. Recognition of the issues of today was reflected in the program for the technical sessions, which covered the regional sales agency plan and related legislation, research, fuel distribution, credits and the adoption of a model code of fair trade practice for the industry.

Charles E. Bockus, New York City, president, Clinchfield Coal Corporation, was again chosen president of the association. C. W. Watson, Cincinnati, Ohio, receiver, Elk Horn Coal Corporation; Harry L. Gandy, Kleenburn, Wyo., president, Sheridan-Wyoming Coal Co.; and Charles O'Neill, New York, vice-president, Peale, Peacock & Kerr, Inc., were elected vice-presidents. Col. W. D. Ord, Alexandria, Va., president, Empire Coal & Coke Co., was re-elected treasurer, and C. B. Huntress and C. C. Crowe were returned to the posts of executive secretary and assistant secretary-treasurer, respectively. Directors elected at the annual meeting were as follows:

District Directors, One-Year Term—O. L. Alexander, president, Pocahontas Fuel Co., Inc. (West Virginia); Charles E. Bockus (Virginia); George C. Eastwood, vice-president, Consolidated Coal Co. (Michigan); William Emery, Jr., president, Cambridge Collieries Co. (Ohio); J. D. Francis, vice-president, Island Creek Coal Co., and president, Appalachian Coals, Inc. (West Virginia); Harry L. Gandy (Montana-northern Wyoming); C. G. Hall, general manager, Walter Bledsoe & Co. (Indiana); Robert E. Lee, president, Consolidated Indiana Coal Co. (Iowa); L. C. Madeira, 3d, assistant to the president, Madeira, Hill & Co. (Pennsylvania); Fred S. McConnell, vice-president, Enos Coal Mining Co. (strippers); Charles A. Owen, president, Imperial Coal Corporation (Pennsylvania); C. F. Richardson, president, West Kentucky Coal Co. (western Kentucky); C. F. Spencer, president, Pittsburg & Midway Coal Mining Co. (Kansas); S. L. Yerkes, president, Grider Coal Sales Agency (Alabama).

District Directors, Two-Year Term—J. E. Butler, general manager, Stearns Coal & Lumber Co. (Tennessee); B. M. Clark, president, Rochester & Pittsburgh Coal Co. (Pennsylvania); W. J. Cunningham, president, Crummies Creek Coal Co. (eastern Kentucky); C. C. Dickinson, president, Dickinson Fuel Co. (West Virginia); C. W. Gibbs, general manager, Harwick Coal & Coke Co. (Pennsylvania); R. L. Ireland, Jr., vice-president, Hanna Coal Co. (Ohio); Douglas Millard, vice-president, Colorado Fuel & Iron Co. (Colorado-New Mexico); James B. Smith, president, Spring Canyon Coal Co. (Utah-southern Wyoming); Grant Stauffer, president, Majestic Coal Mining Co. (Arkansas-Oklahoma); A. B. Stewart, president, Davis Coal & Coke Co. (Maryland); J. P. Williams, Jr., president, Koppers Coal & Transportation Co. (West Virginia); George J. L. Wulff, president, Western Coal & Mining Co. (Missouri).

Directors at Large—J. G. Bradley, president, Elk River Coal & Lumber Co., Dundon, W. Va.; Ira Clemens, president, Commercial Fuel Co., Pittsburg, Kan.; John C. Cosgrove, president, West Virginia Coal & Coke Corporation, Johnstown, Pa.; Walter H. Cunningham, Chicago; L. T. Dee, vice-president, Lion Coal Corporation, Ogden, Utah; Michael Gallagher, president, Northwestern Mining & Exchange Co., Cleveland, Ohio; R. H. Knode, president, Stonega Coke & Coal Co., Philadelphia, Pa.; J. D. A. Morrow, president, Pittsburgh Coal Co., Pittsburgh, Pa.; Charles O'Neill, New York; W. D. Ord, Alexandria, Va.; S. A. Scott, vice-president, New River Co., Macdonald, W. Va.; J. W. Searles, president, Pennsylvania Coal & Coke Corporation, New York City; and C. W. Watson, Cincinnati, Ohio.

Ex-officio—E. C. Mahan, president, Southern Coal & Coke Co., Knoxville, Tenn.

"More progress had been made in 60 days after the formation of Appalachian Coals, Inc., than in the last twenty years in the Appalachian region," said Mr. Francis, in opening the discussion of the regional sales agency plan at the morning session June 15, presided over by Mr. Searles. Coal has long been mined and prepared efficiently, but heretofore, declared Mr. Francis, it has not been distributed in the best interests of either the industry or the public. Appalachian Coals, Inc., started operations April 17, with the realization that it was not a monopoly and that all trade channels must be kept open. Prices have been set to allow the coal of members to move freely in competition among themselves and with outside coals. Since it began business, the agency has stopped the decline in Appalachian prices, and has made some progress toward securing fairer levels. The experience of Appalachian Coals, Inc., had left no doubt that the possibilities for improvement were almost limitless. Competition from other regional agencies would be welcomed, because it would be intelligent competition.

There still remains the question of competition from other sources of energy, which in 1932 could have taken one-half of the 300,000,000 tons distributed in that year. One of the best weapons is an attractive delivered price, and to secure this the railroads must help. In addition, the industry is con-

fronted today by the National Industrial Recovery Act, which makes cooperative marketing even more essential. The act and its purposes are necessary, in Mr. Francis' opinion, but the industry should use its influence to see that it is administered to protect coal. If the industry is to pay more wages and work shorter hours, it must market more intelligently, as arbitrary price-fixing is impossible in the face of outside competition. Consequently, the industry needs permanent marketing plans of its own, and in considering codes of fair practice under the act, the formation of regional sales agencies also should be taken up, as they offer the best route to cooperative marketing and better salesmanship.

The coal industry has been faced with the problem of controlling overproduction for ten years, and similar conditions in other industries were responsible for the passage of the National Industrial Recovery Act, said H. L. Findlay, vice-president, Youghiogheny & Ohio Coal Co., Cleveland, Ohio. Northern Coals, Inc., he said, was originally planned to include all of Ohio and the northern West Virginia Panhandle. Operation began June 7, with the majority of the tonnage in the Pittsburgh No. 8, Cambridge, Middle and Bergholtz fields included. Southern Ohio has not yet arrived at a decision, and a freight rate differential made present inclusion of the Panhandle inadvisable. Within two days after operations started, a wage increase affecting 25,000 miners was voted.

With the formation of the sales agency the region was in better position to cooperate with the government under the National Industrial Recovery Act. Provisions giving the administrators power to force cooperation from unruly minorities is a favorable development.

H. S. Clark, vice-president, Rochester & Pittsburgh Coal Co., Indiana, Pa., and C. F. Richardson, president, West Kentucky Coal Co., Sturgis, Ky., stated that while introduction of the recovery legislation had slowed organization plans in central Pennsylvania and western Kentucky, further steps would be taken. Early operation was predicted for Alabama Coals, Inc., by H. T. De-

James D. Francis

Bardeleben, president, DeBardeleben Coal Corporation, Birmingham, and for Northern West Virginia Coals, Inc., by S. D. Brady, Jr., president, Osage Coal Co., Morgantown, W. Va. K. A. Spencer, vice-president, Pittsburg & Midway Coal Mining Co., Pittsburg, Kan., who said that regional agencies were being actively considered in the Southwest, expressed concern over the possibility that the National Industrial Recovery Act would make competition with oil and gas more difficult.

Research was the subject of the afternoon session on June 15, presided over by Mr. Knode. Citing beneficial results in other industries, Mr. Cosgrove made a strong plea for a cooperative program for soft coal. Of the two principal kinds of research—product and market—the latter is the more likely to be overlooked, though it offers the greater possibility of profit. As an example, Mr. Cosgrove referred to the work of the West Virginia Coal Association in stimulating the use of coal tar in highway construction. For the country as a whole, five times as much asphalt is used as coal tar, and in West Virginia the proportion formerly was two to one; contracts now call for equal quantities of asphalt and coal tar.

In other days, the principal problem of the coal industry was production. Now, Mr. Cosgrove pointed out, the industry must win back lost markets and develop new outlets. A central research organization to carry out projects and act for the good of the entire industry offers the best profit possibilities. Such an organization would handle only common problems, and benefits would include: reduction in research cost, elimination of duplication, speedy results, possible patent returns, improved public relations through dissemination of authoritative information, and maintenance of higher product standards.

Bituminous Coal Research, Inc., was organized along these lines by the market research division of the National Coal Association. Its first problem is the recovery of lost markets, particularly the profitable domestic trade, and present plans call for the expenditure of $300,000 for a three-year program.

The coal industry has been accused of slowness in adopting a technical and market research program, said Clyde Williams, Columbus, Ohio, assistant director, Battelle Memorial Institute, whereas actually a probable major cause of delay is the difficulty of defining the problem. Since 80 to 85 per cent is burned as a fuel, combustion is the most important outlet for coal, and consequently the most important subject for study, with emphasis on the problems of the smaller users. Gasification would be the ideal method of distribution, but its widespread adoption in the near future is questionable. The next most important problem is the development of a method of burning coal approaching that of gas for convenience, efficiency and cleanliness.

Of the several outlets for coal, the domestic market will readily respond to research in the near future, said Mr. Williams. Here cleanliness and convenience are the most important factors, as cost becomes a primary element only in larger installations. In addition to stokers, pulverized-fuel units for the home offer possibilities. However, a large number of hand-fired furnaces will remain, and the owners should receive instruction in firing methods and suitable types of coal. Selective mining offers another avenue to solid fuel satisfaction in the future, as does briquetting

In the Spotlight at Chicago

- How does the regional sales agency plan fit into the present picture in the bituminous industry and what is its relation to national recovery legislation? These questions answered by J. D. Francis and H. L. Findlay.
- What effect will commercial and technical research have on soft coal, and how should a program be organized? John C. Cosgrove leads the discussion of these problems.
- What are the fuel distribution problems of today? Four coal men and one oil man give their opinions.
- What general steps is the bituminous industry taking to cooperate under the terms of the National Industrial Recovery Act? Operators at Chicago adopt a "model" code of fair competition.

of fine sizes to absorb degradation and excess slack. In line with these conclusions, Mr. Williams suggested the following research program, the order of the divisions being the order in which they should be taken up:

1. Study of coals to determine those most suitable, from the standpoint of composition and burning characteristics, for use in domestic stokers and pulverizers.
2. Development of a fully automatic domestic stoker.
3. Development of a fully automatic domestic pulverizer unit and a suitable method of collecting fly ash.
4. Establishment of a testing laboratory and an equipment approval system.
5. Study of the qualities of coals for larger stoker and pulverized-coal installations.
6. Study of selective mining (largely problem for individuals).
7. Study of briquetting fines.
8. Study of suggested new uses for coal and choice of most promising one for commercial development.
9. Economic study of coal gasification. (Last two problems to be deferred until program was well under way or conditions warranted taking them up.)

Any research program, said Prof. A. C. Willard, head of the department of mechanical engineering, University of Illinois, Urbana, should be carefully considered, and funds and interest should suffice for several years. He recommended that the Bituminous Coals Research, Inc., program be extended to five or even ten years, and that a coordinating agency be formed to interpret the results for the intelligent use of the sponsors—a necessary step to make the program fully effective.

The coal industry has lost many customers to competitive fuels through lack of knowledge of its product, declared F. H. Daniels, president, Riley Stoker Co. The essential problem in burning fuel is securing the proper air supply. Ease of mixing makes gas an ideal fuel, while with coal and oil the material must first be converted into gas. Conversion of coal into a form approaching that of gas requires that it be pulverized, which brings down the excess air required. With stokers and hand-fired equipment, the added difficulties in controlling fuel fed and air supply make the stoker 4 per cent less efficient, in general, than pulverized coal burners, and reduce the efficiency of hand-fired equipment 5 to 15 per cent, in comparison with the stoker.

Producers and distributors can do much to overcome the inherent handicaps of a solid fuel by giving more attention than in the past to accurate knowledge of each lot of coal shipped, including proximate analysis, B.t.u. content and ash fusion, as an aid in proper application; study of sizing as an aid to combustion, with especial attention to uniformity; collection of information on conditions under which the coal is burned; making mine power plants examples to the country; meeting competition squarely (sale of both coal and oil by distributors); and failure to meet oil and gas competition in the domestic field.

Charles O'Neill

The gas industry, said Arthur Hewitt, president, American Gas Association, grew out of research into coal utilization. In the development of the gas industry, it evolved into a customer for coal and also, in certain applications, a competitor. Today, the gas industry has its research well organized through committees and subcommittees in the six sections and the natural gas department of the American Gas Association. Research work is supervised and correlated by the executive board and a committee on coordination of scientific and marketing research.

"Fuel Distribution" was the topic of the forenoon session on June 16, with W. J. Jenkins, president, Consolidated Coal Co. of St. Louis, presiding. Mid-Western producers, declared G. D. Cowin, president, Bell & Zoller Coal & Mining Co., Chicago, have experienced a variety of market conditions, and have done much experimental work to foster the use of their product. The Illinois "Quality Circle" group, for example, has been engaged for some time in the promotion of contacts with dealers and in the use of radio and newspaper advertising. Results showed that newspaper advertising will stimulate sales, but the type of campaign used was too expensive. There is merit in ethical efforts to bind dealers closer to supply. A reduction in destructive intra- and inter-district competition is necessary for prosperity, and aid in this direction is seen in the National Industrial Recovery Act. Wasteful duplication of selling effort should give way to cooperative work backed up by research to develop new and efficient equipment.

Distribution problems affecting the coal industry of New Mexico were detailed by G. C. Davis, manager, Stag Canon Branch, Phelps Dodge Corporation, Dawson, N. M., in a paper read by R. L. Perry, vice-president, Moffat Coal Co., Denver, Colo. The primary problem of the state's producers, said Mr. Davis, is oil competition in the railroad and industrial markets and natural gas competition in the domestic market. In Mr. Davis' opinion, a broader policy by the railroads would have checked some of the inroads, particularly of fuel oil, in which the carriers set an example for industry.

Another disturbing change is the growth in trucking. Here, again, the carriers failed to offer any general assistance. The consumer, Mr. Davis held, is vitally interested only in the delivered cost, and to this end freights should be reduced and retail yards consolidated to reduce cost. Heavier summer buying should be stimulated by cooperative action to reduce mine prices, freight rates and retail margins by producers, railroads and retailers.

Passage of the National Industrial Recovery Act made discussion of past distribution methods obsolete and future developments a matter of speculation, declared W. A. Richards, president, Sovereign Pocahontas Co., Bluefield, W. Va., in a paper read by J. E. Westervelt, New York City, vice-president of the company. Smokeless coal movement, said Mr. Richards, is divided about equally between rail and water. Industry and the domestic trade each absorb approximately 40 per cent of the shipments; railroads, 1.67 per cent; the remainder is mixed with high-volatile coal in coke making. Consequently, smokeless coals are subject to unusually severe competition from other sources of energy, and producers have lost business in spite of low prices and improved preparation, one of the reasons being heavy freight charges.

Smokeless producers, asserted Mr. Richards, will be glad to cooperate under the National Industrial Recovery Act, but desire relief from "unfair" transportation rates. As every sale of substitutes results in corresponding unemployment at coal mines, their use should be suspended where their price is equal to or above that of coal, or substitutes should be taxed to take care of the coal-mine unemployment they produce.

With the regional sales agency plan and its attendant classification and price-fixing aspects robbing the coal salesman of price appeals, his employer must give him some new argument to consummate a sale, declared J. Noble Snider, general manager of sales, Consolidation Coal Co. In the absence of price flexibility salesmen must be thoroughly educated in the product they sell and backed up by expert assistance, especially as the industry is rapidly getting into the same position as the railroads, which have a fixed price for service and therefore must sell it on its merits. Mr. Snider echoed the

views of previous speakers on freight rates, and advocated consideration of the franchise plan as a means of lightening the dealer's burden and thus enabling him to spend more time on his real job —selling.

Declaring the present situation is the result of an "excess of excesses," R. C. Holmes, former chairman of the board, the Texas Co., offered three reasons for the growth and continuance of the depression: (a) misinterpretation and misapplication of federal and state anti-trust laws; (b) unethical and destructive practices in industry; (c) excessive extension of credits, much of which contributed to these practices. The President, said Mr. Holmes, has moved to relieve industry of the effects of anti-trust measures and destructive practices, although cooperation of federal and state authorities is necessary where anti-trust laws are concerned. Improvement in the credit situation can come only from a rise in the value of commodities and securities, which in turn awaits favorable action on today's problems. Mr. Holmes expressed the hope that industry would accept with confidence Washington's offer of cooperation in rectifying destructive practices.

The problems of the oil industry, Mr. Holmes remarked, parallel those of the coal industry, and are due to selfishness and failure to cooperate. State and federal authorities cannot be accused of a lack of interest or a desire to assist. Proper oil conservation should contemplate only the production of primary and essential products, of which fuel oil, generally, is not one. If this conclusion were accepted, the coal industry would benefit through relief from fuel oil competition to the extent of 40,000,000 tons.

Adoption of a code of fair competition in accordance with the provisions of the National Industrial Recovery Act was the order of business at the final session on June 16, presided over by Ira Clemens, president, Commercial Fuel Co., Pittsburg, Kan. Discussion of the code, developed by a special committee of nineteen operators appointed at a meeting in Washington, D. C., June 5, and revised during the course of the convention, found Eastern and Western operators, in general, divided as to whether it should be a model for the guidance of individual districts and groups or a national code relating to wage scales and working conditions.

Consideration of the code was prefaced by the report of Charles O'Neill, chairman of the government relations committee of the National Coal Association and the special committee of nineteen. Mr. O'Neill declared that General Johnson, appointed by the President to administer the industrial control provisions of the act, had requested that, if possible, a national code should be drawn up, which was interpreted by the majority to mean a set of principles around which divisions in the industry could build their own measures, and recommended that the industry, within the limitations of outside competition, cooperate as far as possible with the purposes of the act. The sessions of the National Coal Association were thereupon declared at an end, and the meeting continued as a general meeting of bituminous operators without regard to association affiliations or membership.

James D. Francis moved for the adoption of the code as submitted by the committee as a "model" for the guidance of individual districts, expressing the opinion that a general code and a number of district codes would be illegal, inasmuch as each district code would be an agreement and therefore should conform to local conditions. His view that the proposed code was all that could be offered of a general nature was shared by W. W. Keefer, president, Pittsburgh Terminal Coal Corporation, Pittsburgh, Pa., and C. F. Richardson, president, West Kentucky Coal Co., Sturgis, Ky., though Mr. Richardson was of the opinion that a committee should be appointed to gather the necessary information and fix minimum wages by districts. W. L. Robison, president, Youghiogheny & Ohio Coal Co., Cleveland, Ohio, pointed out, however, that carrying out investigations necessary to correlate wage scales and other conditions would be a stupendous job, and expressed the opinion that it was properly a task for the federal administrators.

Taking the opposite view on the question, L. P. Love, president, Pershing Coal Co., Des Moines, Iowa, declared that Iowa operators, under union contracts, would have to know the plans of other districts before participating in a code, and advocated inclusion of wages and hours in the proposed measure. R. H. Sherwood, president, Central Indiana Coal Co., Indianapolis, Ind., expressed the opinion that competing districts must agree on hours of work and minimum wages before codes would be acceptable, while Sam Ballantyne, president, Iowa Coal Operators' Association, Des Moines, declared his impression that no district codes would be accepted. C. S. Keith, general manager, Central Coal & Coke Co., Kansas City, Mo., advocated an industry-wide code so that an unbroken front could be presented to competitive fuels.

Declaring that the proposed code did not go far enough, D. W. Buchanan, president, Old Ben Coal Corporation, Chicago, moved that a committee of district representatives be formed to extend the code and correlate hours of work, labor rates and coal prices. William G. Caperton, Charleston, W. Va., seconded Mr. Francis' motion, and a *viva-voce* vote was taken. At this point, Roderick Stephens, New York City, chairman of the government relations committee, National Retail Coal Merchants' Association, who had previously advocated extension of the code to clearly define the relationship of operators and distributors, asked whether adoption would mean that nothing further would appear in district codes, and was advised by Mr. Francis that districts would not be restricted. The chair then announced that the vote was in favor of the code as submitted.

Mr. Buchanan then renewed his motion for the formation of a committee to extend the code, and after a brief debate the chair entertained a motion to adjourn, which was declared passed after a *viva-voce* vote and a show of hands.

Declaring that if ever an industry needed help it was coal, and that the President could have done no more than propose the National Industrial Recovery Act, General Johnson told coal men assembled at the annual association dinner on June 16 that coal was one of the ten major industries that were expected to present broad codes at once. General Johnson's address was relayed by radio from Pittsburgh, Pa., where he was forced down while flying to the dinner.

The idea behind the administration's recovery program "is simply for employers to hire more men to do the existing work by reducing the work hours of each man's week and at the same time paying a living wage for the shorter week." This, however, cannot be done without ruin to many unless all competing companies and industries take concerted action. "The simplest and most direct course for each industry is now to submit as an industry entirely what it would like to do, first, to carry out our primary purpose, which is to put men back to work at decent living wages

Ask More Safety Work

Praise for the past work of the National Coal Association in the promotion of mine safety and a recommendation that it be continued in the future were included in a resolution adopted at the Chicago meeting. Due to a desire to give the code of fair competition the right of way at the last session, the scheduled addresses and discussion of safety and workmen's compensation by Milton H. Fies, vice-president, De-Bardeleben Coal Corporation, Birmingham, Ala.; Otto Herres, assistant manager, United States Fuel Co., Salt Lake City, Utah; E. J. Newbaker, vice-president, Berwind-White Coal Mining Co., Windber, Pa.; Dr. L. E. Young, vice-president, Pittsburgh Coal Co., Pittsburgh, Pa.; and Thurlow G. Essington, counsel, Illinois Coal Operators' Association, Chicago, were omitted, but will be included in the proceedings of the meeting.

in the shortest possible time and, second, those provisions which you find it absolutely necessary to include to protect the willing and forward-looking among your members from the racketeers and price cutters and those who are willing to take advantage of the unselfishness and public spirit of other men." Specific proposals would be the subject of later development.

"Model" Code of Fair Competition For Bituminous Coal

Whereas, the President and Congress of the United States by the enactment of the National Industrial Recovery Act, have declared the existence of a national emergency, productive of widespread unemployment and disorganization of industry, which condition seriously affects the bituminous coal industry of the United States; and

Whereas, by the provisions of said Act and for the purpose of securing cooperative action among trade groups, of eliminating unfair competitive practices and of generally rehabilitating industry, the President of the United States is authorized and empowered to approve codes of fair competition for the several industries of the country;

Therefore, ..., a voluntary association comprising a representative group of producers and wholesale distributors of bituminous coal in ....., has compiled the following rules and regulations into a code of fair competition for the coal producers of said District and submits the same for approval and enforcement in accordance with the provisions of said Act.

I.

General Purposes

Bituminous coal constitutes a major source of heat and energy for the people of the United States, and the industry engaged in its production fills an important and necessary place in the economic structure of the nation. The industry therefore owes a duty to the public, its employees, its distributors at wholesale and retail, and to those whose money is invested and used in the industry; this duty includes the obligation to deal fairly with its employees; to mine its product efficiently; to promote applied research and the proper use of coal and eliminate waste; to sell at a fair price; to foster orderly, economical channels of distribution from mines to the ultimate consumer; to develop new uses; to approve and encourage sound and fair trade practices in the mining and distribution of coal and to prevent unfair practices. Fair and constructive competition is to be encouraged, but unfair competition must be eliminated.

As the amount paid to employees in the coal mining industry constitutes a far greater part of the total cost than in those industries producing competing fuels, the position of the coal industry with relation to competitive fuels and other sources of energy must be maintained and safeguarded so as to preserve the normal markets and outlets for coal and thus prevent further reductions in coal mine employment.

II.

Employee Relations

It is understood and agreed that some of the parties to this code employ their labor as a result of collective bargaining, and that others employ their labor under satisfactory individual relationship between the employer and the employee; and it is duly recognized that employees are entitled to working and living conditions, and to rates of pay consistent with reasonable standards, and to this end there is hereby established minimum rates of pay as hereinafter set out.

The parties to this.....District code agree that.....hours work shall be the maximum per day in the .....district, except in case of accidents and emergencies, where the safety of the men or the property temporarily necessitates longer hours; and that .....hours shall be the maximum hours per week which any employee may work. (NOTE: Consider possible exceptions).

The parties to this code further agree that the minimum rate per hour for employees employed by the hour outside the mine shall be not less than.....cents per hour, and that the minimum rate per hour for employees employed by the hour inside the mine shall be not less than.... cents per hour.

It is further agreed by the parties to this code that the National Industrial Recovery Act provides that every code of fair competition adopted hereunder shall contain the following conditions: "(1) That employees shall have the right to organize and bargain collectively through representatives of their own choosing, and shall be free from the interference, restraint, or coercion of employers of labor, or their agents, in the designation of such representatives or in self-organization or in other concerted activities for the purpose of collective bargaining or other mutual aid or protection; (2) that no employee and no one seeking employment shall be required as a condition of employment to join any company union or to refrain from joining, organizing, or assisting a labor organization of his own choosing; and (3) that employers shall comply with the maximum hours of labor, minimum rates of pay, and other conditions of employment, approved or prescribed by the President."

(NOTE: It is suggested to the representatives of each district that they prepare and take with them to Washington at the time they take their codes for approval, a full statement as to the rates of pay of all classes of labor at each mine, the average daily earnings of the men employed at each rate and at each class of work. It is further suggested that representatives take with them statement showing the cost of living in their districts, showing rent per house, per room, cost of coal, lights, water and other fixed charges, not including the cost of food and clothing. District representatives can take any such other information as they think may be pertinent and necessary.)

III.

Minimum Coal Prices

Sound economic principles require the sale of all coal at such price or prices as will realize to the producer the cost of production, plus a reasonable margin of profit.

Cost of production shall be computed in accordance with standard accounting practice and the rules and regulations promulgated by the Bureau of Internal Revenue for the determination of Federal income taxes.

Each district shall from time to time fix fair and reasonable minimum prices on the several grades, sizes and classifications of coal produced; such prices shall be based upon the cost of production and the competition of substitute fuels and other forms of energy and upon other competitive market factors. Failure to maintain such prices when so fixed shall be deemed a violation of this code.

IV.

Other Items of Unfair Competition

(a) The consignment of unordered coal to a possible buyer, the forwarding of coal which has not actually been sold, consigned to the producer or his agent, is a violation of this code; provided, however, that coal which has not actually been sold may be forwarded, and consigned to producer or his agent, to Tidewater ports and to lake ports and to docks beyond such ports; but such shipments shall be limited to cover bunker coal or fulfill contracts on advanced sales or for storage by the producer on docks or wharfs for resale by the producer or his agent.

(b) The effecting of adjustments of claims with purchasers of coal in such manner as to grant secret allowances, secret rebates or secret concessions, creates in effect price discrimination, is a violation of this code.

(c) The prepayment of freight charges with the intent or with the effect of granting discriminatory credit allowance is a violation of this code.

(d) In the event of change in prices of coal, the giving in any form of adjustments, allowances, discounts, credits, or refunds to purchasers or sellers of coal, for the purpose or with the effect of altering retroactively the price quoted, in such a manner as to create price discrimination, is a violation of this code.

(e) The pre-dating or the post-dating of any invoice or contract for the purchase or sale of coal, except to conform to a bona fide agreement for the purchase or sale entered into on the pre-date, is a violation of this code.

(f) Terms of sale shall be open and strictly adhered to. The payment or allowance of rebates, refunds, credits, or unearned discounts, whether in the form of money or otherwise, or extending to certain purchasers such services or privileges not extended to all purchasers under like terms and conditions, is a violation of this code.

(g) Attempts to purchase business, or obtain information concerning a competitor's business by gifts or bribes, is a violation of this code.

(h) The intentional misrepresentation of analyses and/or sizes or the making, causing or permitting to be made, or publishing, of any false, untrue, misleading or deceptive statement, by way of advertisement, invoice, or otherwise, concerning the size, quantity, character, nature, preparation or origin of any coal, bought or sold, is a violation of this code.

(i) The making of, causing or permitting to be made, any false or deceptive statements, either written or oral, of or concerning the business policy of a competitor, his product, selling price, financial, business or personal standing, is a violation of this code.

(j) The unauthorized use either in written or oral forms of trade marks, trade names, slogans, or advertising matter already adopted by a competitor, is a violation of this code.

(k) Inducing or attempting to induce, by any means or device whatsoever, the breach of contract between a competitor and his customer during the terms of such contract, is a violation of this code.

V.

Standardization of Sales Contracts

The making of incomplete and ambiguous contracts for the sale of coal provides a medium for unfair price discrimination inducing fraud, giving rise to disputes and disturbing the stability of the industry. Therefore, it is declared that all contracts for the sale of coal shall contain a definite statement of price, quantity, quality and grade, terms of payment, time, rate and place of delivery, and all other elements necessary for a complete contract. It is further declared that a standard form of sales contract shall be used in each district.

VI.

Standardization of Sizes

The screening of coal into numerous and unnecessary sizes adds to the cost of production, and affords opportunities for unfair competition and misunderstanding.

Therefore, it is declared to be for the best interests of producers and consumers that, so far as practicable, there be established in each district a classification of grades and a standard of sizes to be marketed and specifications for each size.

VII.

Producers operating under this code shall furnish the manager of this association such information and reports as to the production and sale of coal as in the judgment of such manager is deemed necessary and expedient to enforce the provisions of the code. Such manager, or his direct representative, shall have the right to inspect the sales contracts (including sales contracts entered into prior to the effective date of this code), books and records of the members of the association, in so far as such contracts, books and records have to do with matters relevant to this code of fair competition. *Provided,* however, that all reports and information furnished by members to or obtained from their contracts, books, or records, by the manager of this association, or his direct representative, shall not be divulged to any other member of this association, nor to any other person, except as it may be necessary to divulge such information to enforce the observance of the provisions of this code, or with a bona fide purpose to enforce such observance.

WITHOUT SUCTION

+ Fine Coal in Unsized Feed

Is Not Properly Cleaned*

By BYRON M. BIRD

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ALTHOUGH jigging is one of the oldest methods of cleaning coal, the practice is still in a chaotic condition. One plant operates its jigs at 40 strokes per minute; another, 500 yd. away and washing the same bed for the same market, runs them at 120 strokes per minute. One plant may use a strong suction stroke and the other practically none. Usually the two plants differ in other important particulars. Surely one or possibly both of these plants are operating inefficiently. Unquestionably some fundamental principles must exist for the correct adjustment and operation of jigs.

Some such reasoning as this caused me to study the art of jigging, an investigation which has continued over a period of years and has extended to scores of plants in various coal-washing areas of the country. This investigation has shown definitely that jigging is not a purely cut-and-try proposition but that there are many common-sense principles that can and should be applied both to the adjustment and operation of jigs. The investigation has also shown that very few jig plants even approach the possibilities of this excellent coal-washing process. The present series of articles is a summary of the conclusions from this investigation written for the operating man.

As an aid to the discussion of this subject it is desirable to consider first just what jigging is. In general, it is the stratification of a bed of coal and refuse in upward pulsations of water or in alternating upward and downward pulsations. The stratification usually is effected in a rectangular open-top container having a perforated bottom, through which pulsations of water are applied to the bed of coal and refuse.

In its application to the cleaning of coal, jigging is a continuous process involving three steps: the reception of raw coal at a regular rate, the stratification of the coal and the refuse, and the withdrawal of the products. Now it happens that the necessity for withdrawing products in a continuous process makes it impracticable to use the best conditions for the stratification of the coal and refuse. For this reason, the determination of the conditions under which the jig will give the best over-all results is an important problem. Furthermore, the maintenance of the best conditions, once they are obtained, introduces many practical problems. In this series of articles an effort will be made to distinguish between the problems connected with stratification itself, which may be considered those of getting a correct initial adjustment of the jig, and those connected with the manner in which jigging conditions can be maintained in continuous operation.

In the course of stratification in a jig two different "beds" of material are formed. In these articles the "jig bed" will be held to refer to the entire mass of coal and refuse resting upon the jig screen. It should be distinguished from the term "refuse bed," also used, which refers only to the layer of refuse that collects immediately over the screen. Throughout these articles jigging will be discussed in relation to the jig bed, for its maintenance in correct condition is the key to successful operation.

To discuss conditions desirable in a jig bed it is necessary to define the two strokes used in jigging and the functions of each. The pulsion stroke is the upward pulsation of water. Its function is to clean a closely sized feed or to clean the coarse sizes of a slack feed (coal passing a screen 3 in. or smaller). Thus in a coal passing a 1-in. screen, the 1-in., the ½-in., the ¼-in., the ⅛-in. and the ¼-in. sizes are the ones most effectively cleaned by the pulsion stroke. The suction stroke is the downward pulsation of water, which, if used, alternates with the pulsion stroke. Its function is to clean the fine sizes in a slack feed. Thus in the above given example the minus ⅛-in. sizes are the ones cleaned by the suction stroke.

The definition of suction as any return of water to the hutch between pulsion strokes should be carefully noted, for it does not limit suction to jigs having moving plungers or baskets to produce pulsations. Thus jigs such as the Baum or the Simon-Carves and the Lide jig, developed by Martin J. Lide, of Birmingham, Ala., use suction as the term is used in this series of articles: when they use downward pulsations of water. In a plunger or basket jig, suction is produced by the combined pull of gravity and the plunger or the basket. In the Simon-Carves type it is produced by gravity alone. Although there is a difference between the downward accelerations of the water under these two conditions, I shall not attempt in these papers to distinguish between them. As I advocate low speeds with plunger jigs in later articles of this series, I am in reality producing very nearly the same conditions on the suction stroke as those obtaining in the Simon-Carves. Thus I do not feel that any distinction is necessary.

Regardless of methods of producing them, downward currents of water between pulsion strokes are necessary to clean the fine sizes. Every investigator of the subject of jigging has arrived at this conclusion and it is to be found in

*First of a series of four articles on jigging.

all textbooks of ore dressing or of coal preparation. Because the efficacy of suction has been so well proved both theoretically and experimentally, I shall deal in this and in subsequent articles only with methods of getting the best results from its use in cleaning the fine sizes, for it is easily possible to do nearly as much harm as good with suction misapplied. As the experimenter is more likely to go wrong with the plunger or basket types, I shall deal in particular with these types, though the same principles apply to all types.

On the pulsion stroke the jig bed should become mobile from top to bottom; this condition is fundamental to good jigging. Whether the feed is a closely sized or an unsized coal determines the degree of mobility required. On a sized feed a rather loose jig bed on the pulsion stroke is desirable, but on a slack feed the jig bed at the peak of each pulsation should become just mobile and no more. This condition of minimum mobility, while permitting separation of the particles, makes the pulsion stroke effective in cleaning the largest possible range of sizes, a very important consideration in washing a slack coal.

The amount of suction to be used on the suction stroke varies greatly, depending upon factors such as the nature of the impurities in the fine sizes, the depth of jig bed, the size of perforations in the screen plate and the tonnage treated per hour. If the impurities are fine particles of sand or pyrite, both of which have relatively high specific gravities, a gentle suction stroke usually suffices. But if they are small particles of "light" bone, a strong suction stroke probably will be needed; and if they are flaky particles of "light" bone, such as the "rash" in many Alabama coals, it may be necessary to increase the effectiveness of even strong suction by using large perforations in the jig screen or by using a shallower jig bed.

Only a skillful operator can determine whether a jig bed has the required mobility and the right degree of suction. To excel he must train himself so that when he thrusts his arm into the jig bed he will be able to determine whether the movement of the bed is such as to favor efficient operation. The "feel" of a mobile bed is difficult to describe. It is fluid, but it is more than that: the individual particles must feel momentarily free to move on each pulsion stroke. The feeling of suction is, perhaps, less difficult to describe. The bed on the downward flow of the water must, so to speak, grasp the operator's arm. The firmness of the grasp is an indication of the intensity of the suction.

At most coal-jigging plants, the pulsion stroke is used to advantage. The only common exceptions occur in the jigging of egg or nut sizes. In the anthracite field, and occasionally in some bituminous fields, the jig beds on the pulsion strokes do not usually become mobile enough for effective work on these coarse sizes. On the other hand, suction, so necessary to the effective cleaning of a slack feed, is rarely used to the fullest advantage, owing largely to a popular conception that it is something undesirable. For this reason, instead of studying it and learning to utilize it effectively in cleaning the fine sizes, many men have been spending their time trying to eliminate it.

Perhaps a single incident illustrating how greatly a little suction affects the cleaning of fine sizes may not be amiss. About five years ago, I visited a mine where some trouble had developed in the jigging of a slack coal. Two two-compartment jigs were washing a coal through a 1-in. screen. The superintendent explained that about two months before my visit, the minus ¼-in. sizes, which were screened from the washed slack and sold separately, had without any apparent reason increased in ash content 3 per cent, yet the ash content of the coarse sizes had remained the same as usual. As far as the superintendent had been able to determine, nothing had been changed at the washing plant. Nor had there been any change in the raw coal, for he had caused a series of face samples to be taken throughout the mine, and these had shown that the raw coal during the previous two months had been cleaner than usual. The problem, therefore, was to find why the fine sizes were being so poorly cleaned.

When I put my arm into the second-compartment beds of the two jigs, I found very nearly pure pulsion strokes. Although no abnormal quantity of water was being used, there was enough excess to neutralize practically all suction, and to give a jigging condition that could not clean the fine sizes. It was obvious that this condition had not existed prior to the time when the difficulty occurred. As the water adjustment was the only variable readily under the operator's control, it seemed likely that he had changed this for some reason.

When questioned, he remembered that, about the time when the trouble had commenced, he had been having some difficulty in getting the refuse to work its way out of the jigs and had opened the water valves a little. As the jigs had given less trouble after this change, he had left the valves with this setting, not realizing that he had adversely affected the separation.

As he remembered the way in which the water valves were set prior to their readjustment he was asked to set them that way again. Fortunately, the water system was fed from a constant-head tank in the plant, so that the water pressure was always constant, and the former condition could be reproduced. After the supply of water had been reduced, conditions in the jig beds seemed more favorable for cleaning the fines. On the pulsion stroke the beds seemed just a trifle short of water; just short enough to trouble the operator if he overloaded his jigs, but not short enough to give trouble under normal load. On the suction stroke there was a distinct, though gentle, tightening of the bed. Although conditions could have been better, and were made so at a later date, they were left unchanged for the time being so as to establish to everyone's satisfaction that the increase of water and consequent decrease in suction was responsible for all the trouble. This proved to be true, for the following day the ash content of the fine sizes was back to normal.

This is a unique illustration in that simply reducing the water supply produced the entire effect; ordinarily the stroke would have had to be lengthened at once to maintain mobility on the pulsion stroke. However, the second compartments were bedded with bone, which, as will be explained in a later article, is the correct condition; thus only a slight adjustment of the water controls markedly changed the condition in the jig beds.

The general discussion and the illustration will give an idea of the conditions to be sought. When it comes to the actual task of setting a jig, the operator is faced with a number of variables. How shall he proceed to get the best adjustment? One plan is to use purely cut-and-try methods; this is the standard procedure in most plants today. Another is to choose common-sense settings for as many as possible of the variables and to adjust the remainder by systematic experimentation. The first method may get results, though the probabilities are against it ever getting the best setting of the jig; the second will always get results and will get them in minimum time.

(This series of articles will be continued in an early issue of Coal Age.)

ILLINOIS INSTITUTE

+ Surveys Operating and Marketing Problems

On Annual Boat Trip

WITH ninety-three members and guests aboard, the Steamer "Cape Girardeau" left St. Louis, Mo., Friday night, June 9, on the annual boat trip and summer meeting of the Illinois Mining Institute. Safety, coal utilization, competitive fuels and mechanical cleaning were the subjects of formal papers at the two technical sessions on Saturday, topped off by a number of operating hints. W. C. Argust, division superintendent, Peabody Coal Co., Taylorville, Ill., presided at the morning session, and H. A. Treadwell, general superintendent, Chicago, Wilmington & Franklin Coal Co., Benton, Ill., held the gavel in the afternoon. Members and guests were welcomed by C. F. Hamilton, Binkley Coal Co., Chicago, president of the institute.

Safety has been a paying proposition for the Bell & Zoller Coal & Mining Co., declared John Lyons, safety engineer, Zeigler, Ill., in discussing the results of an intensive drive to reduce injuries and deaths, which began in 1929. For many years, Mr. Lyons stated, officials were largely interested in tonnage, and took accidents as a matter of course. As a result, serious and fatal injuries were frequent, especially at the Zeigler No. 1 mine, where the average number of fatalities per year was 3.27 for the period 1920-30, inclusive. Tons mined per fatality averaged 310,355, and in 1929, the worst year, the average was 181,046 tons. No. 1 mine was partially mechanized in 1929, and this was generally credited with the increase in injuries in that year, whereas 50 per cent occurred in hand-loading sections.

During the same year, Zeigler No. 2 mine produced 1,329,943 tons per fatality, and between Aug. 7, 1928, and Sept. 27, 1931, hoisted 3,756,525 tons without a death, thus winning a Joseph A. Holmes Safety Association Certificate of Merit. However, a relatively large number of lost-time injuries were occurring, and in view of the records at both mines, a definite safety program was decided on.

The first step was an investigation by a Bureau of Mines engineer, who found that operating officials, both high and low, took only a lukewarm interest in safety. A definite safety program was then laid down and the chief operating officials, through meetings and personal letters, made it plain that they would back foremen and other officials.

To determine causes and results of injuries, a complete record system was started in January, 1930. One of the major objectives, in addition to the determination of physical hazards, was to fix the safety ratings of bosses. As an incentive, monthly prizes were given for the best safety records; later, the system was changed to yearly prizes. In addition, competition between mines was stimulated by awarding money prizes to all bosses at the best operation. This year (1933) the foremen's prizes have been reduced and the difference will be used to present a souvenir to each employee finishing the year without losing a day through injury.

Classes were established for 100 per cent first-aid training, and these were used to acquaint the men with the company's attitude toward safety and to present material on accident prevention. Having laid the foundation for the campaign, the next problem was to keep it going. The company employs special educational posters made under its direction, as well as those supplied by the National Safety Council, and for the last two years has set aside December as "No-Accident Month." No December, as yet, has been perfect, but decided improvements have been marked up in each, together with lasting effects on succeeding months. The first December, an electric safety calendar (p. 246 of this issue) was set up, and has been used ever since. A small monthly magazine, the *Safetygram*, carrying information on accidents and their prevention, is distributed to all employees.

Rescue stations have been built, and teams are trained in the use of rescue equipment and procedure. All entries are rock-dusted and each pair of panel entries is isolated by rock-dust barriers. All returns are checked for methane with the U.C.C. detector. Considerable time is spent in inspecting entries and working places for unsafe conditions. A set of safety standards has been adopted, and the use of safety shoes and headgear is advocated. Since its introduction in 1932, 20 per cent of the men at Zeigler No. 2 are wearing the headgear and 35 per cent have adopted the shoes. Shoes are sold at cost, and hats at one-half of cost.

Results of the work at Zeigler Nos. 1 and 2 mines are given in the accompanying table. The last fatality at No. 1 occurred on Dec. 5, 1930, and since that time 1,912,834 tons of coal has been mined, against the previous aver-

Comparative Injury and Fatality Rates at Zeigler Nos. 1 and 2 Mines, 1929-1932

	Fatalities	Lost-Time Injuries	Days Lost	Annual Tonnage	Tons per Lost-Time Injury	Man-Hours Worked	Lost-Time Frequency Rate	Severity Rate
				ZEIGLER NO. 1				
1929....	8	430	52,552	1,448,364	3,368	1,264,136	340.15	43.74
1930....	3	240	20,562	940,483	3,919	947,288	253.98	21.80
1931....	0	113	1,577	936,785	8,290	975,648	115.82	1.61
1932....	0	71	1,089	698,870	9,483	738,448	96.15	1.47
				ZEIGLER NO. 2				
1929....	0	275	8,710	1,329,483	4,834	1,366,160	201.29	6.37
1930....	0	202	2,078	959,246	4,749	1,147,568	175.99	1.81
1931....	1	94	7,621	859,849	9,147	1,075,272	87.42	7.87
1932....	0	98	3,956	716,790	7,314	1,007,224	97.29	3.92

age of 310,355 tons per death (1920-30). On the strength of this record, the mine was awarded a Joseph A. Holmes certificate early this year. At No. 1 mine alone, in Mr. Lyons' opinion, 6½ fatal accidents have been prevented since Dec. 5, 1930. At an average of $4,150 per fatality, this alone is a saving of $26,975.

Discussion brought out a difference of opinion on the advisability of establishing monetary prizes for bosses, one side taking the stand that some incentive would keep foremen on their toes, while those opposed believed that the miner would likely hold that the efforts of his supervisor were dominated by the possibility of an award, and therefore would not cooperate fully.

Competition affecting the coal industry in general and Illinois in particular was the subject of two papers. Today's trend in the utilization of coal was discussed by John W. Lucas, combustion engineer, Old Ben Coal Corporation, Chicago; and B. R. Gebhart, chairman, public relations committee, Illinois Coal Bureau, Chicago, took up "Competitive Fuels." Up to a few years ago, said Mr. Lucas, Illinois had comparatively little competition in the steam market from other fields, and substitute fuels were practically unknown. Lately, however, marked changes in utilization in all classes of plants have taken place, some favorable to Illinois and some not.

The three most important changes that have affected the Illinois market are: introduction of new types of fuel-burning equipment; passage and enforcement of stringent smoke ordinances; and competitive fuels. Beyond question, Mr. Lucas declared, changes in equipment have made a pound of coal go materially farther. However, the commercial limits of efficiency are being rapidly approached.

In industrial plants (boilers of 200 hp. or over) side-feed stokers and natural-draft chain-grate stokers burning small nut and the larger sizes of screenings are being replaced by underfeed stokers using 2-, 1½-, and ¾-in. screenings, forced-draft chain-grate stokers for ¾-in. screenings and pulverized coal burners. Semi-industrial plants (boilers rated at 50 to 200 hp.) are changing from hand-fired shaking grates to underfeed, overfeed and forced-draft chain-grate stokers, or from egg, nut and 2-in. screenings to 2-, 1½- and ¾-in. screenings or 1½-in. stoker special. Domestic heating plants (boilers and furnaces less than 50 hp.) are changing from hand-fired grates and prepared sizes to underfeed stokers and screenings, stoker special and pea. The result is an increase in the demand for smaller sizes. Consequently, the present trend is toward a narrowing of the price differential between prepared sizes and screenings, with a mine-run basis as the ultimate objective.

Passage of smoke ordinances in a number of market centers have benefited Eastern fields at the expense of Illinois. When presented with the alternative of burning low-volatile coal, installing stokers or shutting down, most of the domestic plants and several semi-industrial plants turned to New River and Pocahontas mine-run. A more favorable development was marked increase in stoker sales, but this was not an unmixed blessing for Illinois, inasmuch as a number of poorly designed machines were distributed, which could use only low-ash, high-fusion eastern Kentucky screenings. If at any future time wage scales in Eastern fields should approximate those in Illinois, said Mr. Lucas, these plants must be replaced with efficient equipment.

Declaring that the steady decline in coal's participation in the energy market of the country requires the maximum of collaboration between producers and combustion engineers to halt the inroads of substitutes, Mr. Gebhart, whose paper was read by F. S. Pfahler, president, Superior Coal Co., Chicago, pointed out that over 20 per cent of the owned homes in Illinois now use oil for fuel, or four times the national average, and that replacement of coal by oil and natural gas in the Central West has cost Illinois producers 15,000,000 tons per year (10,000,000 tons for oil and 5,000,000 tons for natural gas). Fifty-nine cities in Illinois, Iowa, Minnesota, Missouri, Nebraska and South Dakota now use natural gas industrially to the equivalent of 4,600,000 tons annually, and in 185 cities actual or impending natural-gas competition threatens 4,000,000 more tons in the industrial field.

The two major issues between coal and oil and gas are cost and convenience, said Mr. Gebhart. Delivered cost is two-thirds freight, which makes railroad assistance a necessity. The coal man, however, has lagged behind oil and gas in selling and applying his product. Stokers furnish an effective weapon in competing with substitutes, and modern promotional methods also pay. Since the start of the advertising campaign sponsored by the Chicago retail merchants, fewer oil burners have been installed per capita than in any other major city in the United States.

Comparative Analyses of Washed Coking Coal Through ½-In. Round-Hole Screen With and Without Preliminary Dedusting

	Without Dedusting, Per Cent	With Dedusting, Per Cent
Ash content, material from slurry shakers	16.0	7.5
Ash content of "smalls" before addition of slurry and dust	5.5	4.5
Ash content of "smalls" after addition of slurry and dust	6.5	5.5
Moisture	10.0	6.5
Ash content of dust	....	9.5

In 300 Mid-West cities, investigation has shown that in general $1 worth of Illinois coal is equivalent to $2 worth of fuel oil and to $3 worth of natural gas. In Chicago, competitive tests at two hotels with coal at $5.15 per ton and oil at 4¾c. per gallon, showed coal to be 36.1 per cent cheaper in one case and 43.3 per cent cheaper in the other.

One feature of this year's meeting was a session on mechanical coal cleaning. Discussion was opened by W. C. Adams, Koppers-Rheolaveur Co., Chicago, who declared that the object of preparation is to increase marketabiltiy and stabilize the value of coal by insuring the shipment of a uniform fuel that will meet the particular demands of the user. The extent and method of preparation is primarily an economic problem in which the market requirements, the consumer's measure of value and the monetary returns are the controlling factors.

R. G. Lawry, Roberts & Schaefer Co., Chicago, discussed the Stump "Air-Flow" coal cleaner (*Coal Age*, February, 1933, p. 56). C. W. Waterman, Chicago, vice-president, McNally-Pittsburg Mfg. Corporation, read a paper by J. W. Wilson, washery engineer, on the Norton washer, Montgomery-Pittsburg "Multi-Pulse" jig and Pittsburg dewatering and classification equipment.

Dedusting of coal was discussed by E. M. Myers, fuel technologist, Dorman, Long & Co., Ltd., Bowburn, England, in a paper read by J. D. S. Drinkwater, engineer, coal washing department, Link-Belt Co., Chicago. Dedusting greatly decreases the quantity of "slimes" in wet-washing, said Mr. Myers, thereby facilitating drainage of the washed product and clarification of the wash water, while in air-cleaning, dedusting increases the efficiency of stratification and reduces the moisture problem.

Comparative results at two plants under the author's observation are given in the accompanying table. Both plants employ Baum-type washers, but dedusting with Simon-Carves equipment is done at only one, though the results, including a marked improvement in coke from the dedusted coal, have warranted installations at other plants.

Desirable factors in the design of a dedusting plant, according to Mr. Myers, are: maximum removal of the desired size from coal in which the "fines" contain 6 to 8 per cent of free moisture; minimum removal of oversize particles; provision for blowing the dust away from the air gaps; gentle handling of the coal; a closed air circuit; and a low system resistance to cut down power requirements.

Presentation of the material in the "Kink-Box," in charge of H. H. Taylor, Jr., vice-president, Franklin County Coal Co., Chicago, concluded the technical sessions. This material is summarized on pp. 245-246 of this issue of *Coal Age*.

DIRECT FIRE FIGHTING

+ Quenches Stubborn Anthracite Fire

One-third of a Mile Long

By S. D. DIMMICK

General Manager
Glen Alden Coal Co.
Scranton, Pa.

A FIRE which might easily have destroyed much property, if it had not been promptly halted, occurred in the workings of the Wanamie colliery of the Glen Alden Coal Co., Sept. 15, 1931. Skirting a caved and inaccessible area, the fire gave the officials in charge much concern, but because it was sealed with great promptitude, the entire area affected was reopened and put into operation within 24 days after the conflagration was discovered.

Traveling with unusual rapidity, the fire threatened to eat its way into an area where it could not be fought by water and, had it done so, it would have been necessary to shut down completely, for an indefinite period, a large part of the Wanamie operation. The thickness of the coal bed, the extensive timbering and the bottom being covered by a loose filling and refuse helped to impede the building of permanent seals, one of which was 125 ft. long, 26 ft. high and needed for its erection an excavation from 14 to 20 ft. deep, if a firm, airtight foundation was to be erected.

Wanamie colliery, which dates back to about the close of the Civil War, is located in Newport Township, Luzerne County, Pennsylvania, approximately 2½ miles southwest of the city of Nanticoke. Its first owner was the Lehigh Coal & Navigation Co. It was later sold to the Wilkes-Barre Coal & Iron Co., which later became the Lehigh & Wilkes-Barre Coal Co. Three principal openings tap the property: No. 3 slope and No. 14 slope, both at what is locally called the "No. 19 end," and No. 2 slope, at what is locally called the "No. 18 end." A barrier pillar is maintained between these two parts of the property to keep water from traveling from one of these areas to the other. In addition to these openings are several drifts and tunnels.

The Wanamie property contains ten beds of coal, none of which is approached by shafts, but the fire herein described attacked only the lowest of these seams, which is known as the Bottom Red Ash and is worked off slopes Nos. 3 and 14. Both these slopes are driven down on the north dip of the basin, No. 3 slope being in the Bottom Red Ash bed and traveling a distance of about 1,500 ft. from the outcrop toward the basin on an average dip of about 18 deg. Thus far, it has not reached the bottom of the basin. Four lifts, or gangways, are driven off the slope to the east and five in the opposite direction.

Slopes Nos. 3 and 14, being connected by several tunnels, are ventilated by a steam-driven 24-ft. ventilating fan located 100 ft. west of the mouth of the No. 3 slope on the outcrop of the main return airway, which airway parallels slopes Nos. 3 and 14. A manway about 40 ft. east of No. 3 slope parallels the slope as far as the 4th east gangway.

As will be noted in the later description, the fire was confined to No. 3 slope, its manway and the 2d and 5th west gangways off the slope; the fire on the east side of the slope, while it gave those who fought it much apprehension, because of the possibility of its entering the inaccessible area, spread only a short distance from the slope and only in two gangways: Nos. 2 and 4 east.

No. 14 slope has been driven in the Ross bed down the north dip from the outcrop toward the basin for a distance of about 1,500 ft. and nearly parallel to No. 3 slope. The Ross bed lies immediately above the Bottom Red Ash bed, in which No. 3 slope has been sunk and its workings developed. The mouth of No. 14 slope is located 450 ft. westward of the mouth of No. 3 slope, which is connected with that slope of the 5th west gangway and by No. 26 tunnel. The far end of this tunnel connects with the foot of No. 14 slope through a tunnel level gangway. Tunnels Nos. 6, 8 and 7 from the 1st west, 2d west and 3d west gangways, respectively, also connect slopes Nos. 3 and 14.

The bottom of the 4th east gangway is driven on along the barrier pillar between the workings of Nos. 19 and 18; the latter, as will be recalled, being worked through No. 2 slope. The 4th east gangway is about 3,100 ft. long and from it 56 chambers had been driven directly up the pitch of the coal bed. The main pumping plant of the opening also is situated on this gangway, about 200 ft. east of the No. 3 slope. Falls and other causes have rendered this gangway and all the contributary workings inaccessible. Its chambers, moreover, contain much loose coal and boney gob, which would furnish ready fuel for a stubborn fire.

At a point about 2,100 ft. east of No. 3 slope, along No. 4 east gangway, a short tunnel had been driven, through the dividing rock, into the top split of the Red Ash bed, which bed at that point was workable. The 4th east gangway therefore branched off at that point into the top split of the Red Ash bed, where some sixteen chambers were working. The only connections between Nos. 19 and 18—that is, between No. 3 slope and No. 2 slope workings—were eleven boreholes and three crosscuts. Four of the eleven boreholes were located along the 4th east gangway about 1,000 ft. eastward of No. 3 slope and the rest were in the Top Red Ash bed, along the extended portion of that gangway. The three crosscuts were located in the Top Red Ash bed at the extreme end of that long roadway. To exclude air, these boreholes and crosscuts had to be permanently sealed.

As far west as the line of No. 14 slope in the Ross bed, the territory off 3d and 4th west gangways also was inaccessible and, as on the east side, presented an ideal condition for a stubborn gob fire. Third west gangway itself was accessible, but 4th west gangway had been abandoned. From the foregoing description, it will be appreciated

that unless immediate and effective steps were taken to put out the fire before it reached the inaccessible area, the management of the company would be confronted with an almost hopeless task, or at least one which would necessitate the closing down of that part of the colliery for a long time.

At 5 p.m. on Sept. 15, 1931, the night fireboss, starting on his trip of inspection, descended No. 3 slope and encountered smoke at the 3d west gangway. Not being able to proceed farther, he returned to the surface and notified the colliery officials by telephone. He then went down to No. 14 slope and notified the night shift working inby No. 26 tunnel, later directing them to safety by way of No. 8 plane, which is driven in the Kidney bed, to the surface.

The colliery officials went down No. 3 slope as far as the 3d west gangway, where, as had been the case with the night fireboss, smoke prevented any further progress. They then went down No. 14 slope and through No. 26 tunnel to the 5th west gangway, which, as will be recalled, was driven off No. 3 slope in the Bottom Red Ash bed. Here they were stopped by dense smoke coming from the direction of No. 3 slope. They were, however, able to determine that the fire was somewhere between No. 26 tunnel and No. 3 slope. Reaching the surface, after having ascertained that care had been taken for the safety of all workmen, the colliery officials requested assistance from the management.

Within a very short time an apparatus crew arrived on the scene and imdiately went down No. 14 slope and through No. 26 tunnel to the Top Red Ash gangway—which, incidentally, was directly connected with No. 26 tunnel and a short tunnel off No. 3 slope. It was first thought that the smoke would be cleared if two ventilating doors were opened, thus permitting the fire to be fought with a hose. This, however, by admitting air through No. 14 slope, enabled the fire to spread more rapidly.

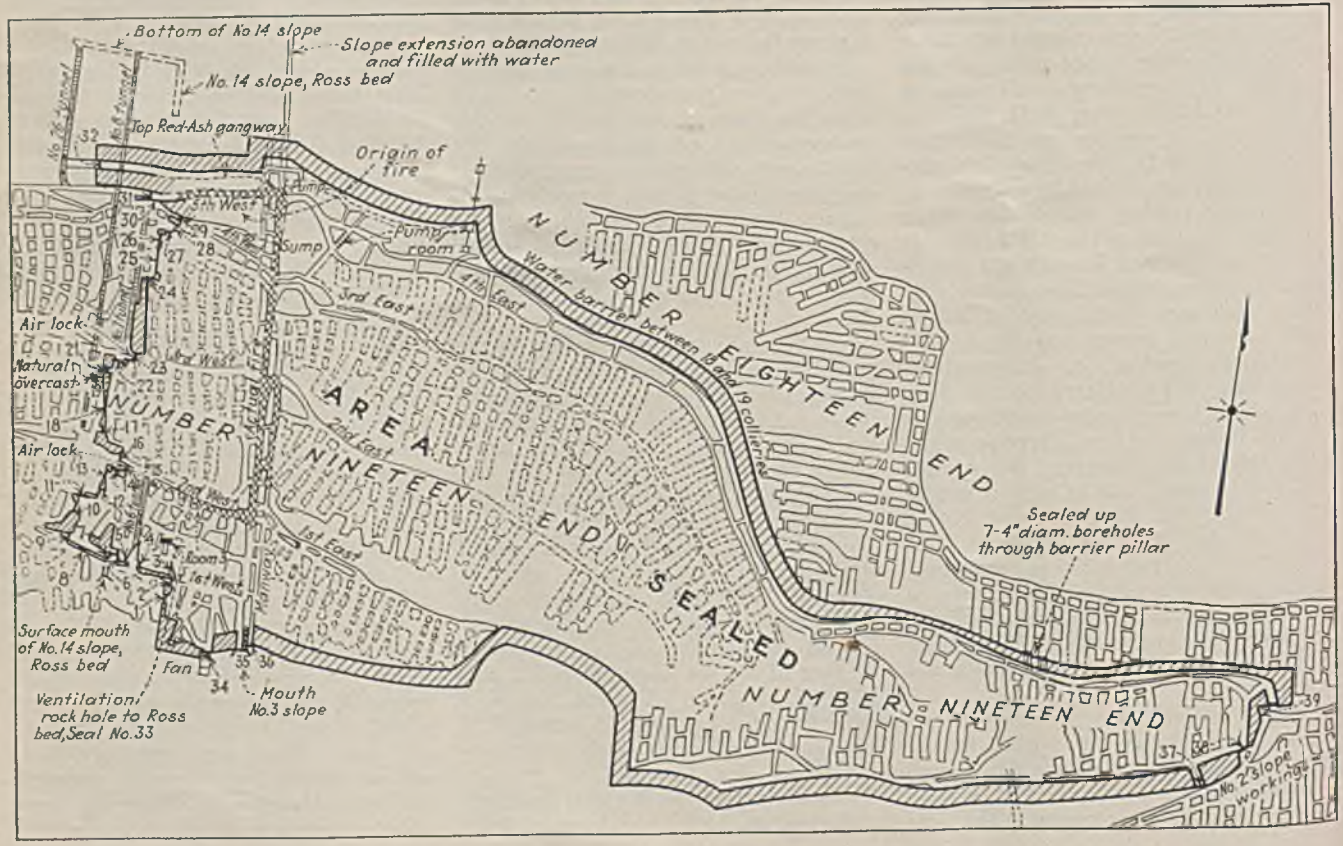
By this time the fire had eaten its way from the foot of No. 3 slope into the parallel gangway (in the Top Red Ash bed), making it impossible to cross the slope to the main pumproom, which, as already stated, was on the east side of the slope. For this reason, the water from the main pump could not be piped with hose for the subjection of the fire. Decision was then made to connect a portable electric pump so that it would draw water from the drainage ditch of No. 26 tunnel.

Two lines of hose were laid, one to the Red Ash gangway and the other to the parallel Top Red Ash gangway, to which reference already has been made; but, before either of these lines could be put into operation, the main pumproom being cut off by the fire and not being operable, the sump of the pumproom overflowed and filled the two parallel gangways to a depth of 3 ft. Consequently, as there was much water underfoot and fire overhead, work on those two gangways had to be suspended at 3 a.m. of Sept. 16.

By this time, the fire, which had already advanced some distance up No. 3 slope, created a column of heated air that converted No. 3 slope, the manway and the return airway into a gigantic ventilating furnace. Aided by the exhaust fan, they acted as a chimney, with No. 26 tunnel as the inlet. Through these chimney-like outlets—all of which came to the surface—poured dense clouds of smoke and poisonous gases. Those connected with the fighting of the fire, therefore, had to go into the mines either through No. 14 slope, thence through No. 26 tunnel, or through No. 8 plane in the Kidney bed, which, incidentally, was on the north rise and two miles away from the mouth of either slope No. 3 or 14.

In order to shut off the inlet currents by which the fire was being fed, 1-in. hemlock-board brattices were erected at each of the openings by which the several beds debouched into No. 26 tunnel. The top of No. 3 slope and the manway were similarly sealed, after, however, short-circuiting the smoke to the fan outlet. The speed of the fan also was reduced. To permit the erection of temporary stoppings on the 1st, 2d and 3d west gangways and their adjacent connecting openings, the fan had to be continued in operation until 10:30 p.m. While the temporary seals were being erected, exploring parties discovered that the fire had traveled up No. 3 slope

Fig. 1—Section of Wanamie No. 19 Mine, Glen Alden Coal Co., Showing Sealed and Fire Areas With Connections to Unaffected Workings.



to a distance 900 ft. from its foot, to the 2d west gangway and westward on this level for a distance of 300 ft. At the 3d west level, it had crossed over from the slope and started up the manway. In its travel, the fire burned everything in its path, including doors, track sills, mine cars, etc., causing the roof to fall in places to a height of 30 ft.

All the temporary seals in No. 3 slope section of the mine were completed at 9 a.m., Sept. 17. Permanent seals were then erected on the surface, across No. 3 slope and manway; also in the fan duct, thus completely closing the chimney through which the fire was discharging. Temporary seals were erected also in the three crosscuts which connected the fire area with the section served by No. 2 slope. The eleven drainage boreholes which connected No. 3 slope and No. 2 slope workings also were sealed, thus preventing any air from entering the easterly side of No. 3 slope by way of No. 2 slope workings.

As soon as the temporary seals were completed, three shifts of workmen began installing permanent concrete stoppings. This work, involving the erection of 36 permanent seals and three air locks, was completed on Sept. 25. Some of these seals were put in by apparatus men under extraordinarily hazardous conditions, for noxious gases permeated the air. In every case, to obtain a secure and airtight footing, excavation had to be made in the filled ground covering the original floor.

At seal No. 13, which was 125 ft. long and 26 ft. high, 14 to 25 ft. of material had to be removed to reach rock bottom. On No. 26 tunnel level, the water was 6 ft. deep, and a rowboat had to be used to transport men and material from dry land in No. 26 tunnel to the point where the two lower seals on the Red Ash and parallel gangways had to be erected.

At 4 p.m., Sept. 25, the day on which the sealing was completed, the gases within the sealed area, at the junction of the 3d west gangway with No. 3 slope analyzed:

	Per Cent
Carbon dioxide	6.8
Oxygen	4.9
Carbon monoxide	0.8
Methane	1.3

The temperature was 95 deg. F. An apparatus crew entered the air lock on the 3d west gangway and traveled a distance of 900 ft. up the slope and in the 2d west gangway to Chamber No. 3, where a temperature of 180 deg. F. was encountered on the top of a fall. No other sign of fire was discernible.

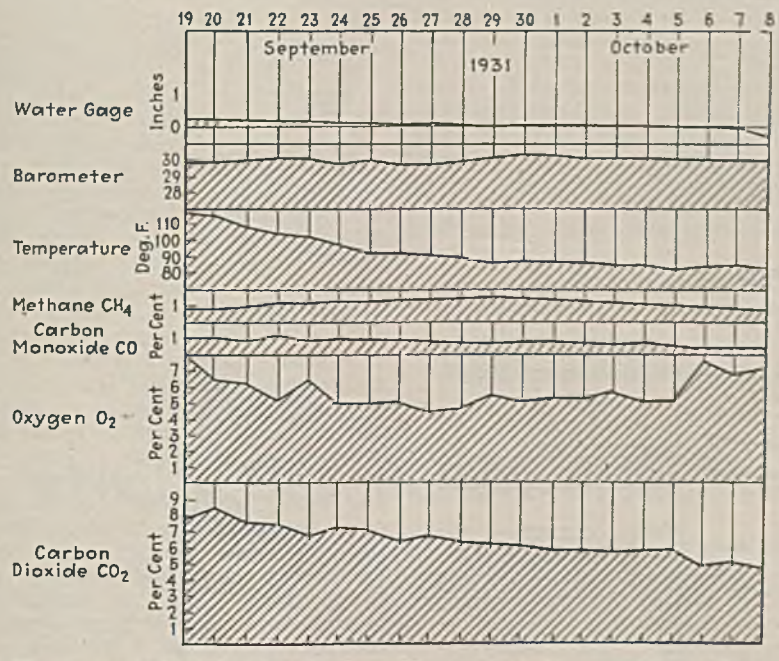


Fig. 2—Analysis of Gas Samples From Pipeway Seal, Wanamie No. 19 Fire.

In what follows, the air locks will bear names identical with those of the gangways on which they are located. On Sept. 26, apparatus crew entered the 3d west air lock and walked down the slope to the water at the foot, a distance of 870 ft. on a dip of 20 deg., and found the track sills burned out on the slope, but no visible sign of fire. On Sept. 28, the apparatus crew entered the 3d west air lock, walked up the slope to the cut-off opposite the 2d west gangway, back down the manway to the pumproom near the foot and up the slope to the starting point—a total distance of 2,400 ft.—and found no visible signs of fire.

On Sept. 30, the apparatus crew walked to Chamber No. 3 in the 2d west gangway, a distance of 250 ft., and found a temperature of 200 deg. on the top of the fall, previously visited from the 3d west air lock on Sept. 25. After returning to the air lock, a 2½-in. water line, which was connected to the pump column of No. 14 slope, was laid through the air lock within which a two-hose manifold, equipped with shut-off valves, was installed. From this manifold, two lines of hose played water on top of the wall in Chamber No. 3. The hose location was changed every hour. This work continued until after the area was opened.

On Oct. 3, the apparatus crew found that a 30-ft. fall at the entrance of No. 2 east gangway near the slope, 280 ft. in from the 3d west air lock, had a temperature of 230 deg. F., so a 2½-in. water line was laid from the pump column in No. 14 slope through the air lock, with a two-hose manifold inside, to which two lines of hose were attached to play water on and into the fall. Gas-pipe nozzles 8 ft. long driven into the loose material were used to force water into the debris.

This plan was continued until Oct. 9, when the seals on the fan duct and the 2d west air lock were opened and the ventilating fan was operated at a low speed in order to remove noxious gases. Later the air lock on 3d west gangway was opened to admit fresh air, and finally the lowest seal on the Top Red Ash parallel gangway was broken, permitting the whole of the sealed area to be reventilated. A constant watch was maintained to note if the air was rekindling any of the heated falls on which water was being sprayed.

However, on Oct. 13, the fourth day after the mine had been reventilated, small tongues of flame were discovered creeping out of the fall along the lower rib of the Red Ash gangway. A temporary seal, later replaced by concrete, was immediately erected up against the fall, thus sealing off 300 ft. of the 5th west gangway, between the foot of No. 3 slope and seal No. 31 near No. 26 tunnel. This fire had not been extinguished by the original sealing because of an open water trap, 10 in. square, in a vertical chute at seal No. 30, which admitted sufficient air to maintain the fire in a dormant condition.

Meanwhile, 1½ miles of 6-in. water main was laid on the surface as a second line of defense, with flush trough and dump and a 6-in. borehole down to the Red Ash 1st west gangway. These provisions, fortunately, were found unnecessary.

In all, 40 permanent concrete seals were erected, each of which, to fill voids and pores and to prevent air from leaking through cracks in coal pillars or through shrinkage cracks around the seals, was faced with "Paragon" wood-fiber plaster. Gibbs, McCaa and Burrell breathing apparatus were used by the fire fighters.

All fire was extinguished and the mine placed in operation 24 days after the fire was discovered. The total length of slope and gangway on fire at the height of the conflagration was, roughly, one-third of a mile.

NOTES

. . . from Across the Sea

AMERICAN mining men will note with interest what happens to American mining machinery when it falls into British hands and is subjected to British demands for the protection of the miner from roof falls. In this department has been described, for instance, the adaptation of the scraper loader to British regulations (Vol. 36, pp. 544-545). In England, the scraper is largely fed by hand shovels and runs under a row of timber sets, with guides that keep it from colliding with the vertical members of these sets.

Recently the Joy loader was adopted in British mines. It loses some of its efficiency because it is allowed to work only on an 8-ft. face, but the men working at it have maximum protection, for the machine has no less than four sets, each comprising two props and a corrugated-steel cap, to support the roof above it. These props are now of wood, but will be replaced eventually by composite steel props. The loader works along a longwall face, removing a slab, or "buttock," of coal 8 ft. wide which has been kerfed by a longwall cutter. Its movements are entirely unhampered, and it should work with a quite fair degree of efficiency and yet in entire safety.

In this longwall face, 51 men are employed, and the average production per man per shift is 7.05 tons. At present, says H. Watson Smith and G. M. Gullick, in a paper read before the Institution of Mining Engineers, the buttock is shot with explosives. Experiments are to be made to adapt the hydraulic cartridge to this purpose. As will be noted, the coal is quite readily dislodged, being under much pressure and held only on two faces.

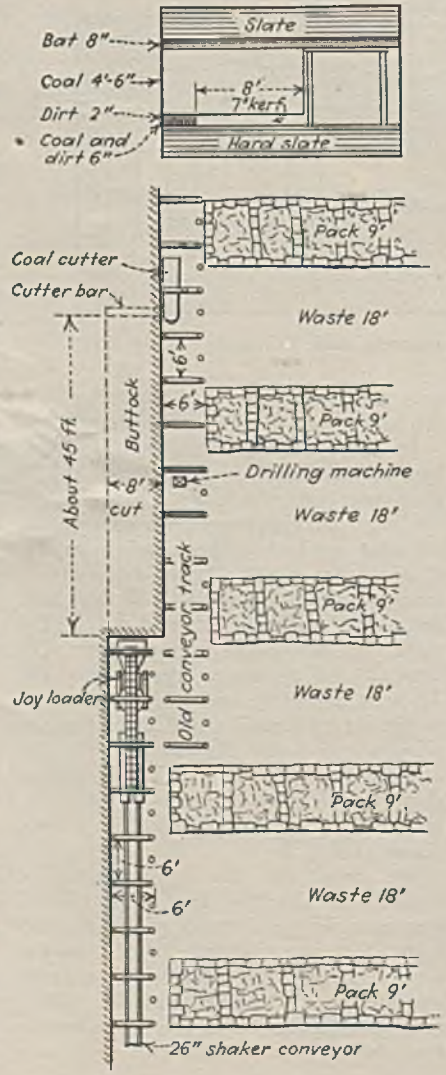
At another operation where only wood chocks and props are used for the support of the face, the Joy-loader coal face is producing 10 tons per man shift. Figured on a basis of exchange at $3.41 per pound, the wage is $1.91 per shift at the latter mine and the cost per ton is 28.97c., including labor, explosives, power, interest, depreciation, repairs, renewals and general maintenance.

At a meeting of the German Mining Association, Bergassessor C. Beyling stated that from experiments made by the German safety authorities in the Hibernia colliery, at Herne, it had been found that the flame from an explosive in an unstemmed hole of given length actually is smaller when more explosive is used, apparently because the explosive in the latter case fills some of the dangerous free space in the hole. A shothole a meter deep with one cartridge will emit a bigger flame than the same unstemmed shothole with eight cartridges in it.

The longer the free space in front of the cartridges and between them and the mouth of the hole, the longer the emerging flame. Tests have shown that with unstemmed shots only that part of the explosive between the detonator and the outer end of the charge is involved in the shot flame that emerges from the hole. So Dr. Beyling is inclined to believe that all shots should be front-primed; that is, the detonating cartridge should be inserted in the shothole last of all. Back-primed cartridges gave the biggest flame.

He also stated that shots which do their work effectively give less flame than

Loading With a Mechanical Loader Into a Conveyor on a Longwall Face.



those which fail to do so. A stemming of 4 in. of clay sufficed in all cases to prevent the flame of "permitted" explosive from emerging from the shothole.

Hence the recommendations seem to be: Beware of long free spaces in shotholes. Shoot into the hole, not out of it, and stem your shots.

In the Ruhr, the usual method of charging is to use two cartridges and to prime from the bottom of the hole. This method has been used for the past fifteen years. It would give the longest flame from the unstemmed hole, but nevertheless Dr. Beyling does not condemn it. He says that when there is a misfire, such a shot can be more safely removed than one which is front-primed, because there is less risk of premature detonation.

Shots of permitted explosives apparently set up a cloud of smoke and fume in which the burning or deflagrating explosive particles, when projected from the shothole, cannot burn. So long as the particles remain in this cloud they do not come in contact with firedamp. Where the detonating charge consists of several cartridges, the smoke-and-fume cloud in front of the shothole is so extensive that burning particles flying outward cannot come in contact with firedamp. Apparently, also, if the hole is long enough, the particles of explosive projected forward in the undecomposed state and ignited by the blast are completely burned up, so that they are rendered harmless before they emerge from the shothole.

In connection with these remarks of Dr. Beyling, which seem to throw doubt on the danger of overcharging a hole, it should be remembered that shots ignite firedamp, not only on emerging from the shothole—if they so emerge—but also by the escape of flame when the coal is blown down. Moreover, Dr. Beyling is discussing "permitted explosives" or, as it would be stated in the United States, "permissible explosives," and not black powder.

Speaking before the Midland Institute of Mining Engineers, W. A. Payman spoke of the replacement of nitrated polyglycerine by nitroglycol. Adding 25 per cent of nitroglycol to nitroglycerine prevents the freezing of nitroglycerine at any temperature likely to be encountered in Great Britain. Nitroglycol itself freezes at —8 deg. F., but warming pans must be used if the explosives show the slightest signs of hardness. Nitroglycol added to nitroglycerine is more sensitive than the latter substance alone, is safer to handle, and has slightly superior explosive power.

Dr. Payman said that wood pulp soaked in a solution of ammonium nitrate and then dried was found to give a bulky composition suitable for a low-density powder. After the impregnation, the wood meal did not absorb nitroglycerine readily, and this was advantageous, because such absorption would render the explosive less sensitive.

As the soaking of wood meal with

ammonium nitrate is extremely dangerous, because of the risk of the material catching fire, the ammonium nitrate is first mixed with 20 per cent of magnesium nitrate or calcium nitrate and heated to 230 to 240 deg. F., when the mixture melts in its own water of crystallization and can be absorbed by the wood or plant fiber used. On cooling, the mixed nitrates resume the crystalline state, and so need no further drying. If a light-weight wood meal, like that from balsa wood, is used, or sugar-cane pith, a low density explosive, Hercoal F, of the Hercules Powder Co., results. Balsa wood, by the way, is known as corkwood.

The du Pont company's low-density explosive uses bulky plant fibers without impregnation. Use of low-density explosives is rapidly increasing in Great Britain. Among the substitutes for wood meal in the making of such explosives are bagasse (the pith and fiber of sugar cane), boiled bagasse, balsa wood, oat husks, maize stalks, ground popcorn and sphagnum (peat) moss. Wood disintegrated by saturation with high-pressure steam, followed by rapid cooling, has also been tried, according to Dr. Payman.

In his reference to Cardox, Dr. Payman stated that in order to prevent Cardox shells from being thrown out or the shothole, recent orders approving the cartridge had directed that before a cartridge is fired a prop, sprag, or other obstruction be set against, or immediately in front of, the mouth of the hole. A shell-retaining device has been developed at Wolstanton colliery to overcome this objection. Dr. Payman declares that the increase in the quantity of lump coal from the use of Cardox was from 5 to 20 per cent, and the number of shots with B 37 cartridge was reduced to one-third or one-fourth as compared with ordinary explosives.

Discussing the Lemaire sheath, which is a covering of the cartridge to prevent the emission of flame through the fractured walls of the shothole, Dr. Payman said that tests at the Safety in Mines Research Station at Buxton, England, had shown that the most practicable substances were sodium bicarbonate and sodium hydrosulphite, the former being the cheaper. The materials used in the original sheath, which contained calcium fluoride, were effective, but sodium bicarbonate was better.

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

Requests for U. S. Bureau of Mines publications should be sent to Superintendent of Documents, Government Printing Office, Washington, D. C., accompanied by cash or money order; stamps and personal checks not accepted. Orders for other books and pamphlets reviewed in this department should be addressed to the individual publishers, as shown, whose name and address in each case is in the review notice.

Keystone Directory for Coal Buyers, 1933. McGraw-Hill Catalog & Directory Co., New York City. Price, $15.

For years the authoritative reference work on coal and coal sources, the familiar Keystone Coal Buyers' Catalog and Mine Directory is now presented, with some changes in content to conform to the new publishing plan, as the Keystone Directory for Coal Buyers. Analyses and geological data featuring former issues have been omitted from the present edition, but the publishers announce that when authoritative data can be secured they will again be included. The user of the new directory, however, will find in the advertising section a mass of late and valuable data on the particular coals and facilities of many of the leading coal companies of the country.

The mainstay of the book is, of course, the up-to-date directory covering active commercial mining companies and giving pertinent information on each of their operations. Data include the names and addresses of the companies, names of important sales officials and operating heads, official names of mines, shipping points and railroads serving them, seams mined and their thickness, daily capacities, preparation methods in use, etc. Cross references to mines by seams are included for the guidance of the buyer who may be interested in coal from any particular bed.

* * * *

Miners' Welfare Fund, 1932, Mines Department (of Great Britain). British Library of Information, New York City. 101 pp. Price, 45c.

This well-illustrated paper covers the eleventh report of the committee appointed by the British Board of Trade to allocate the Miners' Welfare Fund—which is collected by legislative enactment from the companies for the benefit of the miners—and the sixth report of the selection committee appointed to administer the Miners' Welfare National Scholarship Scheme. Financial details cover the first 23 pages, the material in which, with the exception of a table on the cost per user for the maintenance of 56 bath houses, will be of little interest to the American reader. Twenty-eight architects' sketches of colliery bath houses are followed by 12 others of buildings variously described as halls, infant-welfare buildings, institutes, pithead canteens and pavilions, four recreation-ground shelters, two recreation grounds, a children's playground, and three mining and technical colleges.

"Leisurecraft" is described by Commander B. T. Coote. This is an effort to put within the reach of the miner some opportunities for employing his idle time with advantage in musical and artistic pursuits, dancing, study, gardening and what not. This is followed by a recitation of the clauses of the law governing the Welfare Fund and more detailed accounts of expenditures. In closing, the scholarships awarded and the results thereby attained are recorded.

All the buildings are fireproof, well-built and well designed, many in most modernistic style with flat roofs, straight lines and an entire absence of "gingerbread."

* * * *

Machine Age in the Hills, by Malcolm Ross. Macmillan Co., New York City. 248 pp. Price, $2.

Mr. Ross has written a moving story of a grave economic problem in terms of human relationships. Unlike so many who have entered the troubled southern West Virginia-eastern Kentucky coal fields intent upon gathering material to prove a preconceived idea, Mr. Ross, who was associated with the Quakers in their relief work in that region, looked with open and understanding eyes at what he saw and then recorded his facts and impressions in the same spirit. The tragedy which has overtaken many optimistic operators who thought that the war-time demand for coal would be unending is no less real to him than the tragedy which has overtaken the worker who came down from the hills to labor in the mines.

Beginning with a series of brief pen pictures of individual miners, ex-miners and their womenfolk, the author continues to build up his story by similar, if at times less salty, sketches of the operator and his associates. Coming to the strikes which made eastern Kentucky front-page news two years ago, Mr. Ross distributes brickbats and bouquets with fine impartiality and relish in the task. Some of his sharpest blows are reserved for the amateur investigators who sought to invade Harlan and Bell counties and for certain public officials in that region.

The author finds no escape from the conclusion that many of the men in the hills never again will find steady employment at the mines. To meet this situation, he suggests that the tonnage tax idea proposed by *Coal Age* two years ago to finance a national research campaign be applied to the creation of a rehabilitation fund to fit these men for other occupations and to open the door to other employment for their children. Joint administration of such a fund, he says, would open new vistas of understanding.—S. A. H.

OPERATING IDEAS

From Production, Electrical and Mechanical Men

Hanna Adopts Shop Practice For Tool Sharpening

Fundamental changes in the method of loading coal breeds fundamental changes in the methods of preparing the coal. When man-power was used to heave the coal into small-capacity mine cars, usually man-power prepared that coal, and in so doing had to furnish itself with such necessary equipment as shovel, pick, bar, sledge, wedge, auger, file, etc. As a matter of fact, even since the advent of mechanical loading, companies that furnish the shovel (mechanical loader) and other necessary equipment needed to load the coal and prepare it, usually overlook the economic possibilities of the lowly file.

At the Fairpoint No. 9 Mine of the Hanna Coal Co. the standardization program, or, as sometimes rightly called, the "Economic Research Program," has gone so far as to displace the seemingly unimportant file. When in 1930 the Hanna company committed itself to a program of modern improvements it was then decided that every possible avenue of economy would be scrutinized. Therefore, besides loading the coal with Myers-Whaley No. 3 "Automats," cutting the coal with the Universal Oldroyd track-mounted machines, changing cars behind Whaleys with Ironton 5-ton battery locomotives, using a 5-ton mine car of new design, the company decided to do away with the file system of sharpening augers, declares P. R. Paulick, time-study engineer for the company, with headquarters at St. Clairsville, Ohio.

The drilling crew at Fairpoint No. 9 consists of two men for each loading unit who do all the drilling and shooting of the coal for that unit. This crew has a portable truck on which all the drilling and shooting equipment is carried. The drilling equipment of each crew consists of the following: One "Little Giant" electric post drill, one tamping bar, one scraper, one long-handled bugdust shovel, one insulated steel powder box for which the lid is so made that it cannot be left open accidently, one empty powder box to carry "dummies," one set of augers, and one portable emery wheel for sharpening the augers.

The portable auger-sharpening equipment consists of a ½-hp. motor. An emery wheel is mounted on each end of the shaft. One of these emery wheels is coarse and one is fine. This outfit is bolted to the truck bed to hold it steady during the auger-sharpening operation. The illustration shows the driller in the act of sharpening the 9-ft. auger. The outstanding feature of this method of sharpening is that the augers can be tempered much harder and made tougher than for file sharpening. Because of this hardness and toughness only one sharpening to a cut is required (four 9-ft. holes are drilled to a cut). On the other hand, when files were used for sharpening, it was necessary to sharpen the augers after each hole was drilled. A saving in the auger steel is made because of less frequent sharpening.

"Perhaps it will seem far fetched," says Mr. Paulick, "but great potential savings can be effected through fundamental changes in small items. The present price of a regulation file used in a coal mine is approximately 20c. In our mine there are ten sets of drilling crews. We have found, in the past, that each crew used one file every shift, an outlay of $2 per day. In using the emery-wheel method for sharpening augers we find that one wheel lasts, roughly, one year; each wheel costs about one dollar. The potential savings in a large mine on this basis would be well worth going after. The motor used to drive the wheel is ½ hp. and runs approximately 2½ minutes per cut, or a total of 25 to 30 minutes per day. At our operation we have found the emery-wheel method of sharpening augers much superior to the hand-file method, because it is quicker, easier and cheaper."

Sharpening a 9-Ft. Auger in Fairpoint No. 9 Mine.

Steel Jackets Used to Repair Conveyor Drive Frames

Some trouble has been experienced by the Pennsylvania Coal & Coke Co., Cresson, Pa., with the drives of conveyors from the breakage of their frames, and when this occurs a ½-in. boiler-steel jacket is shrunk on all sides of the frame—top, bottom and ends. The steel jacket is welded at all joints and is peened only lightly with a hammer after welding, so as to permit of sufficient contraction of the weld to bring all parts of the jacket in close contact with the cast-iron case and hold it in rigid and correct alignment.

After this has been done, it has been

found that no further trouble is experienced, provided no excessive strains are set up in the shrinkage. If there is excessive strain, it may be expected to manifest itself soon after the work has been completed. Thereafter the frame will perform its functions without further trouble. The correct degree of peening used on the welds is a matter to be determined by experience and observation, the decision depending on the degree of original fracture.

Illinois Institute's "Kink Box" Includes Wide Range of Operating Ideas

COVERING a wide range of operating, safety and maintenance problems, sixteen different operating ideas were presented at the "Kink Box" session during the summer meeting and boat trip of the Illinois Mining Institute, held on the Steamer "Cape Girardeau," June 9-11. H. H. Taylor, Jr., vice-president, Franklin County Coal Co., Chicago, acted as leader in the discussion and presented many of the ideas in behalf of the contributors.

A. L. Reed, electrician, Mine No. 18, Peabody Coal Co., West Frankfort, Ill., described the wooden tools furnished to motormen and tripriders for use in pushing coupling clevises to one side to prevent them from riding up on the locomotive bumper and derailing the first car in bunching loads or empties on a downgrade. At this mine, all main-line locomotive roads have steep grades in both directions. "Monarch" couplings are used, and as a safety measure both the motormen and triprider are provided with two short lengths of wood approximately 20 in. long and Veed on one end. Each tool is made of a 2x4, the Veed end being 4 in. wide, while the grip end is shaved down to 2 in. and rounded. Use of these tools prevents smashed fingers and broken couplings.

A track signal for preventing haulage delays was described by W. C. Craggs, superintendent, Mine No. 43, Peabody Coal Co., Harrisburg, Ill. At this mine, four locomotives use the haulage road leading to the shaft, and to avoid delays and warn trips a blinking light signal is installed at each main road junction. The blinker is designed to be operated by the wheels of the trip, and is made as follows: A piece of strap iron is spiked to a tie, and to this is fastened a brass strip which normally sticks up. When the flange of a wheel passes over the brass strip, it is pressed down on a brass contact fastened onto a block of wood spiked to the adjacent tie, thus completing the lamp circuit. Passage of a number of wheels causes the lamp to blink.

Thomas Garwood, Orient No. 2 mine, Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill., also offered comments on haulage signaling. A two-track main haulage road is used at Orient No. 2, and to avoid collisions between locomotives arriving from opposite cross entries at the same time, signal lamps are so connected that in giving any locomotive a clear signal (green light), connections are first made so that red lights to stop all other trips come on first. Thus, it is impossible to give the clear signals to two trips that might be traveling in the same direction or to two trips when one might cross over onto a track used by the other.

Mr. Garwood also explained a method connecting blower tubing after it has been cut into shorter than standard lengths. Short sleeves of galvanized iron with rolled grooves near the ends are now used. The ends of the tubing are slipped over the sleeve and are tied in place with wire. An eye is fastened to each sleeve for hanging it to the roof. In hanging tubing, said Mr. Garwood, $\frac{1}{4}$-in. holes are drilled, in which are driven small wooden plugs. Nails are driven into the plugs and bent over to form hooks on which the wire is strung.

A third item submitted by Mr. Garwood was a description of a "merry-go-round" jig for facilitating the hard-surfacing of cutter bits. It consists of a circular table made of a scrap auto wheel and other scrap parts, with recesses around the circumference for holding the bits in position for the hardsurfacing operation.

Fred Burnett, superintendent, Mine No. 18, Peabody Coal Co., West Frankfort, described a method of strengthening drill posts for underground use. When the post is received at the repair shop, the repairman takes the inside dimensions of the post and saws out a piece of wood to fit, preferably white oak. After the post is welded or straightened, it is put in the fire, and when fairly hot the wood reinforcement is driven in. The resulting post, said Mr. Burnett, is stronger and very little heavier.

With 100 per cent mechanical loading, requiring 24 loading and 24 drilling crews, the No. 1 mine of the Bell & Zoller Coal & Mining Co., Zeigler, Ill., is on a 100-per cent Cardox shooting basis, said Lee Haskins, superintendent. Diameter of the Cardox shells is $2\frac{1}{2}$ in., requiring a 3-in. drillhole. Officials have standardized on the "Coalmaster" bit, a four-pronged model of heat-treated steel too tough for the common file. Originally, these bits were sharpened on an emery wheel in the blacksmith's shop on the surface, and were delivered on the night shift. Now, sharpening is done at the five underground substations with electric grinders, operated by the attendants in their spare time. Sharpened bits are delivered to the main partings by the main-line locomotives and from there to the face by the gathering units. Bits are strung on a wire with a brass check carrying the number of the loading unit.

Equipment for sand-drying at Mine No. 47, Peabody Coal Co., Harco, Ill., was described by Charles Boyett. At this mine, which normally uses 15 tons per day, the sand originally was transported to the sand house in a wheelbarrow. Demand, however, increased to such an extent that one man with two stoves working eight hours a day was unable to keep up when wheeling in the supply. At a time when the supply was low, a track of 20-lb. rails was built over the top of the stoves, sloping down at an easy grade to a loading point on the ground. A side-dumping hopper was constructed of light sheet iron to hold a maximum of six wheelbarrows. It rests on Ford Model T front wheels, the rims acting as flanges to hold the car on the track. Using this hopper makes transportation of the sand easy, and the stoves are kept full, thus getting the full benefit of the heating surface. The attendant can spend more time keeping the stoves fired and the sand removed.

The use of dynamic braking for emergency stoppage of hoisting engines after failure of the friction brake was the topic of an item submitted by D. W. Jones, superintendent, Valier Coal Co., Valier, Ill. A friction brake is generally used in slowing down or stopping the moving drum of a mine hoist by converting the energy of the descending load into heat, said Mr. Jones. The wooden blocks of the brake resist the motion of the drum with a force due to sliding friction. The coefficient of friction, which is a unit of resistance, decreases as the speed is increased. In other words, for the same brake pressure applied, the coefficient of brake resistance at 60 m.p.h. is only one-half the coefficient at 20 m.p.h. If a hoist is moving at a high rate of speed and the brake is not applied sufficiently in advance, it cannot be stopped before it reaches the landing, although there would be no difficulty in stopping in the same distance at a lower speed.

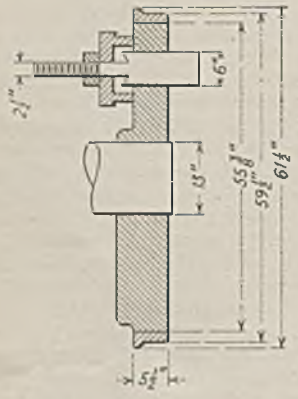
The usual electric hoist with an oil-operated brake requires power to prevent the setting of the brake by gravity. An emergency control valve is operated by a solenoid connected across the circuit breaker, and in case the breaker opens, the solenoid becomes inoperative and the oil valve closes by gravity, causing the brake to set immediately. But if for some reason the friction brake does not hold—lack of pressure, burned blocks or oil—how can the hoist be stopped? One method is for the engineer to open the circuit breaker and thus operate the emergency control for the brake, but this would not be any more effective than the hand-controlled brake against a fast-moving drum having a low coefficient of friction.

Dynamic braking is the solution to the problem, says Mr. Jones. If a properly designed resistance automatically is connected across the terminal of a d.c. motor when the emergency control is made effective through the opening of the circuit breaker, the energy of the revolving drum generates electrical power by converting the motor into a generator, and this power will be absorbed in the resistance across the motor terminals and dissipated as heat. The resistance must provide a greater load than the motor can carry without dropping to a very low speed. The operation is dynamic braking; it is positive and does not injure the motor. Heat developed in the resistance is external to the motor, and if free ventilation is provided, a large quantity of energy can be absorbed in a very short time.

Hoisting-engine repairs involving shrinkage of a band on a cracked disk and the insertion of new crankpins were described by H. J. Kinsman, electrical engineer, Franklin County Coal Co., Royalton, Ill.

The hoisting engines in question, with cast-iron disks, were installed in 1919 to take care of the replacement of 3-ton with 5-ton cars, which began in 1921. In 1923, trouble was experienced with the crankpins, and by Dec. 12, 1925, three pins had been changed on the right-hand engine. Examination showed the bore to be 0.012 in. out of round, and that a crack had appeared in the disk on the pillow-block side about 2½ in. deep and about 3 in. down toward the hub.

Obviously, it was necessary to shrink a band around the disk to close the crack. As the hole was out of round and no tools for reboring were available, it was decided to shrink the band on and make an oversize pin at draw. A railroad-switch-engine tire of the proper size was found, and was turned down by a local machine shop and shrunk on. In the meantime, a pin with a



Hoisting Engine Crank Disk After Repairs

2½-in. diameter shank, 14 in. longer than the proper length and with about 8 in. of threads, six threads per inch, was made at the mine. The threads were used to pull the pin into the disk. The pin was made 0.005 in. larger than the smallest diameter of the hole, and on the last ½ in. it was necessary to use a ram to assist the screw in drawing it home.

Cost of the old tire and turning it down was $91.82. The new pin was made of an old sheave wheel shaft, and its cost, including labor, brought the total up to $165. Only two days' work was lost. A new steel disk ($425) arrived later, but it was decided to repair the left-hand engine in the same way a few months later, chiefly because changing disks would lose five days and cost $450 for labor. The pins have been in use seven years without signs of loosening.

Ian D. Marsh, Alcoa Ore Co., Belleville, Ill., told of an unusual fan drive using a V-belt. The original drive was made up of a 12-in. belt from a 12-in. to a 7-ft. pulley, the latter with a ⅛-in. crown. The 12-in. pulley was somewhat small, so it was decided to use a V-belt drive, which in turn brought up the problem of buying a new fan pulley or cutting grooves in the old. To avoid the expense, it was decided to use the V-belt on the 7-ft. pulley without grooving, and the installation, which includes a 9½-in. grooved pulley on the motor shaft, has worked satisfactorily for over a year.

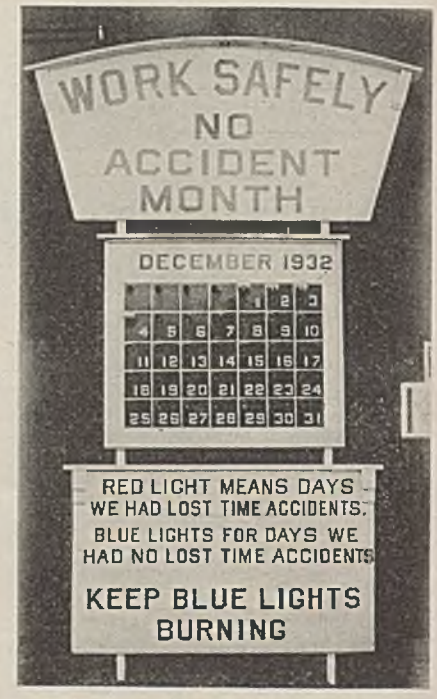
In question and answer form, John E. Jones, safety engineer, Old Ben Coal Corporation, West Frankfort, Ill., took up four safety and maintenance problems. To keep idle equipment from sweating, he declared, it should be covered with canvas and heated with an electric heater having a capacity of 250 watts per 1,000 hp. Burnouts in electric motors can be reduced by winding fields and armatures with asbestos-covered wire, using mica or asbestos insulation, asbestos tape and high-temperature solder. Ultimate temperature thereby will be raised to 400-500 deg. F., against 212 deg., and the cost will be one-half that of factory coils.

The question of speeding with man trips can be solved, said Mr. Jones, by having the substation attendant on the surface reduce the voltage to 175 (or other figure commensurate with distance) as soon as the whistle blows. This cuts maximum locomotive speed to 4 m.p.h. To reduce fire hazard from short-circuits at night or on idle days, the circuit breaker should be adjusted to kick out at a lower amperage.

John Stamper, top foreman, Mine No. 58, Peabody Coal Co., Taylorville, Ill., submitted an idea for an adjustable clevis for quick take-up on new ropes. The clevis, made like a pair of fishplates for track joints, only longer and heavier, allows the rope to be taken up three times, 5 in. each time, before the clamps have to be disturbed.

Electric Safety Calendar

In connection with the annual "No-Accident Month" for 1932 at the properties of the Bell & Zoller Coal & Mining Co., which took place in December, the electric safety calendar shown in the accompanying illustration was used to create interest. According to John Lyons, safety engineer, Zeigler, Ill., height of the calendar is 10 ft. 3 in. and the maximum width at the top is 6½ ft. The calendar part of the board is 42x48 in., and the date squares are 6x6 in. Each date square is drilled for the installation of a weatherproof socket. These sockets are flush with the surface of the board, and are wired from behind.



Safety Calendar at Zeigler No. 1 Mine

The boards have been in use ever since they were installed, and are changed each month to correspond with the calendar by inserting pieces on sheet tin carrying the dates into slot holders of the same material. At the end of each day, whether the mine operates or not, a bulb is placed in the corresponding socket. Blue bulbs denote a no-accident day; red bulbs are used on days when lost-time accidents occur.

Impregnating Armatures

All the motors of the Pennsylvania Coal & Coke Co., Cresson, Pa., when wound, are dropped into an impregnating tank at a temperature of 180 deg. F. for one hour. They are then submerged in waterproof insulating compound. A pressure of 85 lb. per square inch is then applied for one hour, the temperature still being 180 deg. F. The excess compound is then removed and the winding baked for 10 hours at a temperature of 230 deg. F. Higher temperatures in the impregnation would cause too large an emission of naphtha fumes from the impregnating compound. As it is, it is necessary to provide a vent for the removal of the fumes to some point where it is impossible for them to be ignited and cause an explosion. This impregnation is so complete that an alternating-current motor can be run under water for several hours without injury.

Ideas Wanted

This month, the Operating Ideas section includes a summary of the "Kink Box" session at the summer meeting of the Illinois Mining Institute. The importance of operating, electrical, safety and maintenance short cuts in the every-day conduct of coal-mining operations is evidenced by their inclusion in the proceedings of a number of institutes throughout the country, and for that reason these pages warrant your attention, both as a monthly source of information and as a forum where ideas which you have developed can be brought to the attention of others. *Coal Age* will welcome the opportunity to consider your material, and will pay $5 or more for each acceptable item. A sketch or photograph should accompany them when necessary for clearness.

WORD from the FIELD

Smokeless Sales Agency Formed; Others Planned

Although plans for the formation of additional district sales agencies were slowed up somewhat in June while operators pondered on the effects of the National Industrial Recovery Act, progress nevertheless was made in a number of fields. Actual operations were started by Northern Coals, Inc. (covering eastern Ohio), on June 7 and a tentative organization for the Smokeless Coals Corporation was completed at a meeting of southern West Virginia low-volatile operators on June 20. Approximately 73 per cent of the smokeless tonnage signed up at the meeting, but operation will be deferred until 80 per cent is secured.

Early operation was predicted for Alabama Coals, Inc., which received a charter on June 10, and Northern West Virginia Coals, Inc., last month. Action on central Pennsylvania plans for Eastern Coals, Inc., and an agency in western Kentucky were held up by the recovery act. A plan for the organization of Pittsburgh District Coals, Inc., was presented to western Pennsylvania operators in June. Southern Ohio operators met late in May and early in June, and appointed a committee to study plans already drawn up.

Operators in the Southwest continued active consideration of sales agencies for both the bituminous and semi-anthracite districts, and in the Rocky Mountain region Colorado and New Mexico representatives met at Denver, Colo., June 26, to talk over both a fair-practice code and a central sales agency.

U. P. "Old Timers" Celebrate

The sun always shines in Rock Springs, Wyo., when the Union Pacific Coal Co. Old Timers get together, and the day of the ninth annual celebration, June 10, was no exception. While the bands tuned up their instruments, the association held its annual business meeting, electing the following officers: president, D. V. Bell, Rock Springs; vice-president, William McIntosh, Superior; secretary, A. G. Hood, Superior; treasurer, Frank Tallmire, Rock Springs.

With weightier matters out of the way, the celebration got under way with a parade headed by Governor Leslie A. Miller, George B. Pryde, general manager of the company; Eugene McAuliffe, president, and his granddaughter, Jean Tucker. The annual banquet was featured by the presentation of 40-year buttons to Jesse James, Rock Springs, and Adolph E. Stebner, Hanna. Forty-year buttons also were awarded to John Hunter, Sr., Bremerton, Wash., and James Attryde, Hanna, who were unable to be present. Miss Mary Taylor, the only woman member of the association, was presented with 32 roses, one for each year of service.

In accordance with the annual custom, the celebration was preceded by a first-aid field day on June 9. Leaders among the men's teams were: Superior, Hanna No. 1 and Hanna No. 2. A feature of the day was the presentation of a Joseph A. Holmes Safety Association Certificate of Honor to the company to mark a major reduction in accidents at its eleven mines in 1932.

Jeddo-Highland Power Plant

Jeddo-Highland Coal Co., Jeddo, Pa., has let a contract for the following equipment for a new power plant to the Combustion Engineering Corporation: two 703-hp. bent-tube boilers; two Coxe stokers; two water-cooled front arches; and two "Elesco" superheaters. Rating of the installation is 250 per cent, and No. 4 buckwheat will be burned.

In the equipment list for the Harlan Fuel Co. plant, Yancey, Ky. (*Coal Age*, May, 1933, p. 167) it was reported that a Cokal Pulverzone stoker would be installed. A later change in specifications provides for the installation of a Detroit stoker.

See Rise in Coal Loadings

An increase of 11.7 per cent in loadings of coal and coke in the third quarter of this year is forecast by Shippers' Regional Advisory Boards. Third-quarter coal and coke loadings are estimated at 1,374,788 cars, against actual loadings of 1,230,322 cars in the same period in 1932.

Coal Production Up

Bituminous coal output rose to 24,870,000 net tons in June, according to preliminary estimates by the U. S. Bureau of Mines. Production in May was 22,488,000 tons, and output in June, 1932, was 17,749,000 tons. Anthracite production rose to 3,905,000 net tons in June, against 2,967,000 tons in May and 2,550,000 tons in June of last year.

Total production of bituminous coal in the first six months of this year was 144,760,000 tons, an increase of 172,000 tons over the output of 144,588,000 tons in the same period in the preceding year. Anthracite output in the first six months was 22,364,000 tons, a decline of 7.4 per cent from the production of 24,162,000 tons in the first half of 1932.

New Plant Construction

New contracts for topworks construction at various coal operations were reported as follows in June:

Big Bend Coal Co., Twin Rocks, Pa.; contract closed with Roberts & Schaefer Co. for Marcus picking table-screen and equipment to prepare lump, nut and slack from mine-run; capacity, 150 tons per hour; to be completed about Aug. 15.

Courtney Coal Co., Helen mine, Gypsy, W. Va.; contract closed with the Fairmont Mining Machinery Co. for three-track tipple equipped with shaker screens to load four sizes, and with provisions for a fifth size in the future; capacity, 200 tons per hour.

Indian Head Anthracite, Inc., Tremont, Pa.; contract closed with the Wilmot Engineering Co. for rolls, conveyors, elevators and screens to handle egg to barley, inclusive; capacity, 100 tons per hour.

Mohawk Mining Co., Kittanning, Pa.; contract closed with Robins Conveying Belt Co. for complete tipple equipped with receiving hopper, plate feeder, single-deck "Gyrex" screen, belt picking table, belt loading boom and auxiliary conveyors for producing clean, picked locomotive fuel; capacity, 150 tons per hour.

Pittsburgh Coal Co., Pittsburgh, Pa.; contract closed with the Koppers-Rheolaveur Co. for construction of a complete tipple and washing plant near Nagley, Ohio. A self-contained sealed-discharge Rheolaveur unit, capacity, 225 tons per hour, will be installed to wash the 4x¾-in. coal. Plus 4-in. coal will be hand-picked, and the minus ¾-in. slack will be bypassed uncleaned. Sizes to be produced are: 6-in. lump, 6x4- and 4x2-in. egg; 2x1-in. nut; 1x¾-in. pea; ¾-in. slack; and combinations as desired. Over-all capacity of the plant is 350 tons per hour.

Wyatt Coal Co., Laing, W. Va., contract closed with the Kanawha Mfg. Co. for five-track screening equipment consisting of shaker screens, loading booms, rescreen and domestic conveyors and steel structure; capacity, 250 tons per hour.

Anchor Coal Co., Highcoal, W. Va.; contract closed with the Interstate Equipment Corporation for 1,600-ft. automatic aerial tramway; capacity, 100 tons per hour.

Crown Hill Reopened

The Crown Hill mines in Kanawha County, West Virginia—idle for ten years—are being reopened by the Great Kanawha Barge Lines, Inc. The company has leased 1,000 acres of coal lands, it is reported, and has applied to the federal government for permission to build a tipple on the Kanawha River for barge service to the Middle West. M. L. Garvey, president, Fire Creek New River Coal Co., Charleston, heads the operation.

Administration Rejects District Codes for Coal; Indiana Agreement Submitted

ADHERING to its original stand, the National Recovery Administration on July 6 definitely rejected the possibility that four or five regional codes would be accepted for the bituminous industry. The industry, it was announced, will be required to agree to one basic code, with supplements to meet strictly regional conditions, and no consideration will be given separate measures until the basic code is agreed on.

This announcement, it was believed, ruled out of immediate consideration the code submitted by Indiana operators on July 1. In taking this step, Indiana withdrew from participation in a joint code with Illinois and Iowa. Fifty-eight companies, representing 10,543,191 tons, or 85 per cent of the production, participated in the code, which fixes, subject to the establishment of competitive wage scales and the same maximum hours of work (32 hours per week and 8 hours per day) in other districts, the following minimum wage rates: inside day rate for men, 50c. per hour; outside day rate, 45c. per hour; cutting, shooting, loading, timbering and caring for places on the tonnage basis, 48c. per ton; solid-shooting mines, 60c. per ton. The code also provides, when authorized by the administrator, for the establishment of a schedule of fair and reasonable prices and for its revision from time to time.

Actual operation of the Recovery Administration got under way on June 20, four days after the President affixed his signature to the National Industrial Recovery Act with the declaration that it "was passed to put people back to work." The act as finally adopted varied from the version introduced (June *Coal Age*, pp. 216-217) mainly in the inclusion of an oil regulation section; the adoption of a subsection giving the President power, on his own motion or upon complaint by any labor or trade group complying with the terms of the act, and after investigation by the Tariff Commission, to regulate or restrict the importation of any competitive article or articles when such importation endangers the success of any code or agreement; the limitation of the licensing provision to a maximum of one year; and the extension of Section 7 to throw additional safeguards around the right of workers to organize for collective bargaining. The latter was accomplished by adopting the House language, as set forth on p. 217 of the June *Coal Age*.

In his announcement that the Recovery Administration was ready to receive codes, General Johnson declared that the major industries, of which coal is one, would have, as far as practicable, first attention. He also emphasized the fact that simple, basic codes covering only maximum hours of labor, minimum rates of pay and the necessary safeguards to protect the constructive and cooperating majority are wanted now, leaving additions, modifications and refinements for later attention.

Each code must include the labor provisions of Section 7, as provided by the act, but it is not the purpose of the administration to compel organization of either industry or labor. In determining maximum hours, each code is expected to limit working time sufficiently to give employment to all the men normally attached to the industry, while minimum wage scales should provide a decent standard of living. Groups presenting codes also are expected to defer price increases to conserve consumer purchasing power.

The Recovery Administration does not expect to be the sole judge of codes presented to it, and provision has been made for three advisory groups—industrial, labor, and consumer—to work with the administrator hearing any particular code. The labor group is headed by the Secretary of Labor, and includes William Green, president, American Federation of Labor, and John L. Lewis, president, United Mine Workers. The interests of the national administration are represented by a National Industrial Recovery Board, headed by the Secretary of Commerce.

Immediately following the signing of the act, the Recovery Administration was urged to permit the inclusion of price-fixing clauses in codes submitted. General Johnson refused to lay down a general rule, but declared on June 23 that "it will be proper" for participants in a code "to have a provision that they are not going to sell products at less than the cost of production. When they go beyond that in price fixing, I would have to step in, because that leads to monopoly."

In an atmosphere of give and take between operators and labor, the cotton textile code, the first to be taken up, went through four days of hearings ending June 30. The basic minimum wage for unskilled labor was set at $12 per week in the South and $13 per week in the North, an increase of $2 over the scales originally proposed. Maximum hours of work per week were fixed at 40 for labor and 80 for machines. One outstanding feature was the continuation of the Cotton Textile Industry Committee, which submitted the code, as a planning and fair-practice agency to cooperate with the Recovery Administration in the future in effectuating the operation of the code and and the policy of the act.

Initial efforts in the bituminous industry were centered on the development of district codes in accordance with the principle adopted at Chicago, June 16, in connection with the approval of a "model" code (see pp. 233-234 of this issue of *Coal Age*) to serve as a guide in preparing regional measures. Early progress, however, failed to bring out a clear-cut adherence to this principle, revealing as it did a tendency to group certain districts, as well as prospective divisions within single districts.

At the request of John L. Lewis, who declared that all codes from union fields must have his approval, union operators from Illinois, Iowa, Oklahoma, Arkansas, Colorado, Wyoming and Montana met with representatives of the union at Chicago, June 29. As a result of the conference, a number of operators, both union and non-union, in all parts of the country, were asked by the conferees to meet in Washington, July 7, to consider a general code. Illinois operators working under contracts with the Progressive Miners of America held a separate conference with Progressive representatives.

Prior to the Chicago meeting, a number of districts in the Middle West, Southwest and Rocky Mountain region had begun consideration of codes, and it was expected that the work of the Arkansas-Oklahoma, Kansas-Missouri, Colorado-New Mexico, Utah and Wyoming groups would be continued, with the prospect that the last four states would join together as a group. Kansas and Missouri operators were reported late in the month to be ready to sign jointly with the United Mine Workers a code adopting present wages and hours. Lignite producers in Colorado organized late in June for the purpose of preparing a separate code.

In the East, opinion pointed to the eventual adoption of basic codes by Northern and Southern operators, respectively. Indications were that one Northern group would be built around Central Coals Associates, organized in June for the purpose of drawing up a code to cover Pennsylvania, Ohio, Maryland, West Virginia and eastern Kentucky. The membership of Central Coals Associates includes the Hillman, Taplin and Paisley interests, in addition to a number of other operators, some with mines in central Pennsylvania and northern and southern West Virginia.

Developments in the Northern field in the latter part of June included conferences between western Pennsylvania, Ohio and northern West Virginia operators as a group and central Pennsylvania operators as a group. Later, the two groups held a joint meeting in Washington, at which time, according to reports, a com-

Malcolm Muir

President, McGraw-Hill Publishing Co., New York, was appointed a deputy administrator for the National Industrial Recovery Administration June 30. Mr. Muir, who joined the McGraw-Hill organization in 1905, is a director of the National Publishers' Association, the American Arbitration Society, the Advisory Board of the Army Ordnance Association, New York district, and the Merchants' Association of New York, is a past president of the Associated Business Papers, and was a member of the National Committee for Industrial Rehabilitation and chairman of the New York Board.

mittee was named to draw up a code for both.

In the Southern field, both the smokeless and Appalachian high-volatile operators held separate meetings, which were followed by a joint conference on June 26. West Kentucky operators, at a meeting on June 22, named a committee to draw up a code for that region, and the question also was taken up by Alabama operators.

A code for the anthracite industry, held by General Johnson to be entirely separate from the bituminous industry, was the subject of informal discussion in the closing days of the month, but definite action was deferred.

The Industrial Recovery Committee of the National Retail Coal Merchants' Association, headed by Roderick Stephens, president, Stephens Fuel Co., New York, initiated steps in June for the preparation of a code to cover the retail trade. The completed code is expected to be ready in July.

United Mine Workers Presses Organization; Wage Increases Spread in East

THE labor situation in June was characterized by the rapid development of two major trends: organization of non-union fields by the United Mine Workers and wage increases in a number of Eastern and Southern districts. In Appalachian Coals, Inc., territory, operators' associations in the Kanawha, Logan and Williamson districts followed the lead of Harlan operators in voting wage increases in accordance with the recommendations of the agency. Kanawha operators raised lower scales to a par with the highest paid. Williamson raised wages 10 per cent, according to reports, while Logan County increases varied from 10 to 18 per cent. Other fields in the Appalachian region were reported to have taken similar steps.

Alabama operators voted increases of 10 to 25 per cent at commercial operations, effective June 16. With the exception of a 11.1 per cent increase by the United States Coal & Coke Co., no action was taken by southern West Virginia low-volatile producers, though it is expected that a raise will be granted in the near future. In western Pennsylvania, two increases of 10 per cent each were granted by the H. C. Frick Coke Co. and the Buckeye Coal Co. In addition to these and other increases granted last month (June *Coal Age*, p. 219), higher scales also were posted by W. J. Rainey, Inc.; Pickands, Mather & Co.; Monessen Coal & Coke Co.; Crucible Fuel Co.; Hillman Coal & Coke Co.; and others. Westmoreland Coal Co. joined with others in its field in granting increases in June, and in the Wheeling (W. Va.) district, the Valley Camp Coal Co. posted a 10 per cent increase at its four mines.

Northern Coals, Inc., covering the Pittsburgh No. 8, Middle, Cambridge and Bergholz fields of Ohio, recommended increases of 10 to 28 per cent to equalize basic scales at approximately $3.20 per day. The increases, affecting 25,000 men, went into effect June 12. In southern Ohio, Hocking, Pomeroy Bend, Crooksville and Jackson operators signed a new wage and working agreement on June 14. In addition to $3.28 for inside day work, $3.10 for outside day work, 38c. per ton for loading and 7c. for cutting, the new contract provides for recognition of the United Mine Workers. Tuscarawas operators also signed a new agreement with the union in June, carrying a wage scale of $3.28 per day and 47½c. per ton for cutting and loading, division of the latter to be fixed at a later date.

Citing the National Industrial Recovery Act as its authority, the United Mine Workers pressed organization work in non-union fields in June, devoting particular attention to Colorado and New Mexico, Utah, eastern Ohio, Pennsylvania, West Virginia, Virginia, eastern Kentucky and Alabama. Independent reports point to real gains in all these fields; the union claims 100-per cent organization in central and western Pennsylvania, northern West Virginia and the Kanawha, Williamson and smokeless fields of southern West Virginia, and large numbers of recruits in Logan County, West Virginia; eastern and western Kentucky, Alabama, and the Rocky Mountain states.

Operators in western Pennsylvania promoting the "employee representation" form of collective bargaining ran afoul of union organizers late in June. Union officials declared that all mines should be unionized, "as provided for in the Industrial Control Bill," and threatened a showdown on the question. Three mines of W. J. Rainey, Inc., were tied up June 20 following the discharge of two members of an employee representation committee, according to reports, and on the same day the Pleasant Valley Coal & Coke Co. force walked out to secure a wage increase of 20 per cent.

Northern West Virginia entered July in some doubt as to the ultimate results of the expiration of the wage agreement with the United Mine Workers. This pact had been extended 30 days from June 1, and several companies were reported to be adding to their forces of mine guards while the union was declaring its intention of bringing the entire region into its fold.

Operators south of the Ohio River "never will accept the United Mine Workers or any other labor organization dominated by our competitors north of the River," J. J. Hume, general manager, Straight Creek Coal Co., is reported to have told a Department of Labor conciliator at Pineville, Ky., June 28. He declared that he was organizing a company union at his operations, and that other operators in Bell and Harlan counties were doing the same.

Peabody Coal Co. mines were again the focal points of clashes between the United Mine Workers and the Progressive Miners of America in Illinois. Seven miners and a special deputy were shot and a score of persons were injured in a pitched battle at Peabody's Peerless mine, near Springfield, Ill., June 7. The clash grew out of an attempt to halt operations by 2,000 insurgent sympathizers, and was finally stopped by National Guard troops. Picketing was banned to prevent further disorders. Two hundred United Mine Workers from Williamson County, imported to replace striking Progressives at the Peabody No. 43 mine, Harrisburg, Ill., were turned back at the Saline County line June 10 to prevent a possible clash with 2,000 pickets lining the eight-mile stretch of highway leading to the mine. On June 20, a motor caravan transporting 30 miners from the mine to their homes at Galatia was fired on from ambush without damage. July 1, Peabody's Woodside No. 53 tipple, Springfield, Ill., was destroyed by dynamite, the first major bombing of mine property since the start of the factional strife.

Dering No. 2 mine of the Rex Coal Co., Eldorado, Ill., idle since a clash between regulars and insurgents, started operations June 27 under a Progressive contract.

Asserting that the big mechanized operations in Illinois had signed contracts with both the United Mine Workers and the Progressives, while the land-loading operations had in general affiliated with the latter, and that each group had encouraged the union with which it had relations, the legislative investigating committee appointed some months ago to reconcile the warring factions declared in its report, presented on July 1, that much of the blame for the strife could be placed at the door of the operators. "One union under a wise leadership and a fair distribution of work among the men" was recommended as a major means of ending the dispute. The committee also asked for grant of power to the Governor to remove sheriffs and states attorneys who fail to enforce the law; legal machinery for the arbitration of disputes; authorization of an investigation into public-utility control in the mining industry to prevent alleged unfair practices; prohibition of ownership or control of coal mines or securities by utilities or their officers.

Hard Coal Rate Cut Approved

A reduction of 28c. to $1.24 per gross ton in freight rates on domestic sizes of anthracite to stimulate hard-coal consumption in Westchester County and Long Island, New York, and New England was approved by the Presidents' Traffic Commitee of the Eastern Railroads at a conference in New York June 23.

Sprague Wins New River Meet

With 22 teams competing, the Sprague team took first place among the white teams at the fourteenth annual first-aid meet of the New River Co., held at Scarbro, W. Va., June 17. Oakwood took first place among the colored teams.

N.C.A. Committeemen Named

C. E. Bockus, president, National Coal Association, has announced the election of the following executive committee for the coming year: J. D. Francis, vice-president, Island Creek Coal Co.; R. H. Knode, president, Stonega Coke & Coal Co.; E. C. Mahan, president, Southern Coal

& Coke Co.; Fred S. McConnell, vice-president, Enos Coal Mining Co.; Douglas Millard, vice-president, Colorado Fuel & Iron Co.; J. D. A. Morrow, president, Pittsburgh Coal Co.; Col. W. D. Ord, president, Empire Coal & Coke Co.; W. L. Robison, president, Youghiogheny & Ohio Coal Co.; J. W. Searles, president, Pennsylvania Coal & Coke Corporation; George J. L. Wulff, president, Western Coal & Mining Co. Mr. Bockus will serve as chairman.

Charles O'Neill, vice-president, Peale, Peacock & Kerr, Inc., has been reappointed chairman of the government relations committee.

Sahara Succeeds O'Gara

The Sahara Coal Co. has been organized to take over the mining and sales activities of the O'Gara Coal Co., Chicago, operating seven mines in Saline County, Illinois, according to Frank H. Woods, president of both organizations. O'Gara will become a holding company.

Coal Duty Voided

Expressing the opinion that Congress did not intend that the import tax of $2 per ton on coal be imposed against shipments from England and Germany, the U. S. Customs Court of New York ruled early in June that such tax could not be collected. Counsel for the National Coal Association and the Anthracite Institute later appeared before the Assistant Attorney General to urge that the government carry the case to the appellate court. Officials have as yet arrived at no decision on appeal.

Alberta Freight Rate Cut

A new freight rate of $5.50 per ton on coal to stimulate shipments from Alberta to Ontario points was confirmed by the Canadian Board of Railway Commissioners last month. This is a reduction of $1.25 from the former rate.

Personal Notes

R. P. Hogan, mining engineer, has been appointed superintendent of the Wyoming property of the Central Coal & Coke Co., Rock Springs, vice Arthur Vail, resigned.

L. F. Gerdetz, general superintendent, Shamokin district, Philadelphia & Reading Coal & Iron Co., Shamokin, Pa., has been appointed special adviser and consulting engineer to the president, with headquarters at Philadelphia, Pa.

W. H. Lesser, assistant to the general manager in charge of the Randolph colliery, Southern Pennsylvania Anthracite Co., has joined the staff of James H. Pierce & Co., Scranton, Pa., as mechanical and electrical engineer. Before going with the Southern Pennsylvania organization, Mr. Lesser was successively mechanical engineer, Madeira, Hill & Co., and combustion and mechanical engineer, Penn Anthracite Mining Co., and was at one time connected with the Philadelphia & Reading Coal & Iron Co.

William W. Williams, formerly superintendent of the Pennsylvania colliery, Mt. Carmel, Pa., has been appointed superintendent of the No. 7 colliery, Susquehanna Collieries Co., Nanticoke, Pa., vice John A. Clarke. G. E. Cleaver, general mine foreman, succeeds Mr. Williams at Pennsylvania colliery. W. B. Geise, formerly in charge of the Short Mountain colliery, Lykens, Pa., has been appointed special mining engineer, with headquarters at Nanticoke.

John C. Cosgrove, Johnstown, Pa., president, West Virginia Coal & Coke Corporation, and chairman, technical research committee, National Coal Association, was elected chairman of the Committee of Ten—Coal and Heating Industries, at the annual meeting held in Chicago last month.

R. E. Hobart, mechanical superintendent, Lehigh Navigation Coal Co., Lansford, Pa., was elected chairman of the Anthracite Section, American Institute of Mining and Metallurgical Engineers, last month. B. H. Stockett, general manager, Weston Dodson & Co., Inc., Bethlehem, Pa., was chosen vice-chairman.

Obituary

J. H. Keeney, Middlesboro, Ky., president, Bryson Mountain Coal & Coke Co., Bryson, Tenn., died at Detroit, Mich., June 15.

F. D. McNellis, 61, general superintendent, Taylor & McCoy Coal & Coke Co., died at Gallitzin, Pa., June 13.

Walter G. Zoller, 66, one of the organizers of the Bell & Zoller Coal Co., died at Chicago, June 6, after a long period of ill health. Mr. Zoller served as vice-president and treasurer until his retirement in 1927.

Frank P. Christian, president, Imperial Colliery Co., Burnwell, W. Va., and one of the organizers of the Imperial Coal Sales Co., Inc., died at his home in Lynchburg, Va., last month.

Industrial Notes

Fred O. Smith, for forty years associated with the Vulcan Iron Works and now a director and executive vice-president, has taken over the sales activity of the company in addition to his other duties.

W. F. Kurfess, manager, mill department, Joseph T. Ryerson Co., Chicago, has been appointed assistant vice-president. M. J. Hartigan succeeds Mr. Kurfess. R. B. Wilson, sales manager, has been appointed manager of the St. Louis (Mo.) plant.

Sullivan Machinery Co., Chicago, has consolidated its Mt. Vernon (Ill.) warehouse with the St. Louis (Mo.) office, and has removed the latter to 2639-41 Locust St.

Permutit Co., New York, has removed its general offices to the McGraw-Hill Building, 330 West 42d St.

Coal-Mine Fatalities in May

Coal-mine accidents caused the deaths of 46 bituminous and 4 anthracite miners in May, 1933, according to information furnished the U. S. Bureau of Mines by state mine inspectors. This compares with 37 bituminous and 15 anthracite fatalities in April and 43 bituminous and 12 anthracite deaths in May, 1932. The death rate at bituminous mines rose slightly from 1.90 in April to 2.05 in May, while the anthracite rate dropped from 5.19 to 1.35, the lowest rate on record. Comparative figures are given in the following table:

BITUMINOUS MINES

	May, 1933	April, 1933	May, 1932
Production, 1,000 tons	22,488	19,523	18,384
Fatalities	46	37	43
Death rate per 1,000,000 tons	2.05	1.90	2.34

ANTHRACITE MINES

Production, 1,000 tons	2,967	2,891	3,278
Fatalities	4	15	12
Death rate per 1,000,000 tons	1.35	5.19	3.66

Comparative fatality rates for the first five months of 1933 and 1932, by causes, are given in the following table:

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

	Bituminous		Anthracite		Total	
	Number Killed	Killed per Million Tons	Number Killed	Killed per Million Tons	Number Killed	Killed per Million Tons
January—May, 1932						
Falls of roof and coal	198	1.561	66	3.054	264	1.778
Haulage	60	.473	16	.740	76	.512
Gas or dust explosions:						
Local explosions	3	.024	...	....	3	.020
Major explosions	44	.347	...	....	44	.297
Explosives	7	.055	7	.324	14	.094
Electricity	17	.134	4	.185	21	.142
Machinery	9	.071	1	.046	10	.067
Surface and miscellaneous	30	.236	11	.509	41	.276
Total	368	2.901	105	4.858	473	3.186
January—May, 1933						
Falls of roof and coal	151	1.259	45	2.438	196	1.417
Haulage	52	.434	11	.596	63	.455
Gas or dust explosions:						
Local explosions	8	.067	8	.433	16	.115
Major explosions	...	....	...	....	...	....
Explosives	9	.075	3	.163	12	.087
Electricity	10	.083	2	.108	12	.087
Machinery	5	.042	...	....	5	.036
Surface and miscellaneous	18	.150	13	.704	31	.224
Total	253	2.110	82	4.442	335	2.421

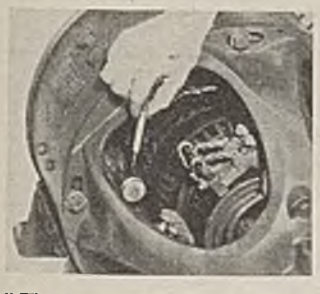
*All figures are preliminary and subject to revision.

WHAT'S NEW
IN COAL-MINING EQUIPMENT

Motor Protection

"Thermoguard" motors, with a built-in disk thermostat that functions before the temperature of the windings reaches the danger point are offered by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. For the first time, according to the company, the combination of a motor with built-in thermostat and a control device with a separate thermal overload relay meets all requirements for protecting motors against burnouts.

Thermoguard motors, at the option of the user, may be arranged to cut off the motor when the temperature reaches the danger zone, or to indicate by a visible or audible signal that an unsafe temperature is being approached. When desirable, these motors can be arranged to stop when the temperature is dangerously high and not to start again until the attendant operates the control. On unattended applications, it is possible to arrange the control so that the motor will restart automatically after cooling to a safe temperature.



"Thermoguard" D.-C. Motor With Thermostat on Windings

Thermoguard motors are available in the following classes: induction (squirrel-cage or wound rotor), standard horizontal type, side mounting, fan-cooled, explosion-tested, vertical hollow shaft, inclosed or splashproof; direct-current, constant, adjustable and varying-speed applications in continuous or intermittent service; mill motors; high-speed synchronous motors; low-speed synchronous motors. Fuses and breakers are eliminated, the company says.

Westinghouse also announces a new line of Type S "Gearmotors," designed for drives

Largest (50-) and Smallest (3-Amp.) Westinghouse Mercury Switches

from ½ to 75 hp. and for speeds from 1,500 to 232 r.p.m. These units, according to the company, can be connected directly to the driven equipment, or through V-belts, flat belts, or chains. Fourteen reduction ratios from 1.12:1 to 5.1:1 are available for each motor speed and horsepower, and the maker states that changes in output speed can be made at small expense.

Westinghouse Lamp Co., Bloomfield, N. J., has developed a new mercury switch which is refractory-protected to confine the arc and thus insure long life with dependability. Nominal ratings range from 3 to 50 amp., and the new line includes six single-pole, single-throw switches that may be operated in a.c. or d.c. circuits. Leads for the six switches range from 6 to 8 in. in length, and are available with special mounting clips to facilitate installation. Diameters of the switches vary from 0.41 to 1.27 in., and lengths vary from 2 to 4⅛ in., not including leads. High uniformity and permanent, airtight seals are stressed by the company.

Portable Compressor

Ingersoll-Rand Co., New York City, now offers a new, two-stage, air-cooled compressor, said to include for the first time in a portable compressor the advantages of two-stage stationary compressors. Size for size, says the company, the new compressors will furnish 23 per cent more air than previous models. Two low-pressure cylinders, arranged in a V, are provided. Between them is mounted a high-pressure cylinder. Air-cooling is said to eliminate the possibility of freezing and reduces size and weight.

Partially compressed air passes through an intercooler, which, the company declares, brings the temperature down almost to that of the surrounding atmosphere, thus, it is said, insuring cooler valves and long life with high efficiency; simplifying lubrication; and eliminating carbon. Power is supplied by a four-cylinder, heavy-duty Waukesha gasoline engine with a special combustion chamber. The compressor is available in four sizes having piston replacements, respectively, of 125, 185, 250 and 370 cu.ft. of air per minute. A variety of mountings are obtainable.

Air-Driven Core Drill

Sprague & Henwood, Inc., Scranton, Pa., offer the "Little Giant" air-driven core drill primarily for comparatively shallow prospecting underground. Lightness, easy handling, strength and durability are emphasized by the company, which states that the machine can be set up and operated in a place 5 ft. high for all types of holes, or even less where horizontal holes are to be drilled. Weight of the machine is 86 lb. without the single column, and drilling capacity is 100 ft. with a ⅞-in. core. Three sets of feed gears are furnished with each machine for obtaining different operating speeds. Air consumption is 56 cu.ft. per minute at 70 lb. pressure.

"Little Giant" Air-Driven Core Drill (Guards Removed to Show Working Parts).

Electric Welder

Hobart Bros. Co., Troy, Ohio, offers the new Hobart electric arc welder for use with both coated rods requiring 42 volts and plain rods requiring 25 volts. Easy operation and waterproof louver construction are advantages pointed out by the company, which states that another feature is remote-control system that permits the operative to weld 50 to 100 ft. from the machine and yet have control of the welding current at his finger tips.

Hobart Welder

Electrical Controls

General Electric Co., Schenectady, N. Y., offers in place of its standard lines of synchronous motor controls new lines incorporating new and important features. Included in this control equipment are relays for automatically applying and removing field excitation and for protecting the stator and amortisseur windings under all operating conditions. For automatically applying field excitation when the motor reaches a predetermined, near-synchronism speed, a new relay, known as the slip-frequency field-excitation relay, is provided. By a simple adjustment, according to the company, its time setting can be varied so that it will apply field excitation at any predetermined speed

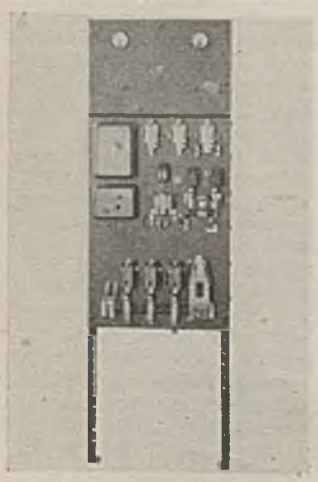
from 92 to 99 per cent of synchronous speed.

The new controllers, in addition, are provided with a power-factor field removal relay which automatically removes field excitation when the motor drops out of synchronism, and also with a two-element temperature relay for protecting stator windings and a temperature squirrel-cage protective relay for protecting the amortisseur windings. A new Telechron motor-operated timing relay is used to initiate the transfer from "starting" to "running" connections on reduced voltages and "part-winding" controllers.

General Electric also offers a new motor base with sound-insulating features. Floating members are mounted on specially developed insulating material, the company declares, and are so inclosed and mounted that long life and freedom from damage result. The motor is mounted on a standard sliding base, and belt tension and motor alignment are maintained in the usual manner. In addition to its sound-insulating qualities, the company points out the following installation and operating advantages: adjusting screw for moving motor for belt tension; bases installed as a unit the same as standard bases; stiffness of the sound-insulating material is sufficient to maintain motor alignment for any reasonable belt tension; guide washers in machined grooves are used with belt-adjusting feature to maintain alignment. Bases are available in the following motor ratings and speeds: polyphase induction motors, 1 to 50 hp., 900 r.p.m.; ¾ to 30 hp., 1,200 r.p.m.; 1 to 3 hp., 1,800 r.p.m.; single-phase motors, ½ to 2 hp., 900 and 1,200 r.p.m.; 1 to 5 hp., 1,800 r.p.m.

Another General Electric development is a new line of small circuit breakers, rated up to 600 volts and 600 amp., for the control and protection of industrial circuits, household circuits and similar applications. These breakers, designated AF-1, are said to operate quietly and permit no external arc. They are trip-free from the operating handle and cannot be held in the closed position when an overload exists. All sizes are designed to fit the ordinary service entrance box, and provision is made for mounting in panel boards, dead-front boards and individual metal inclosures.

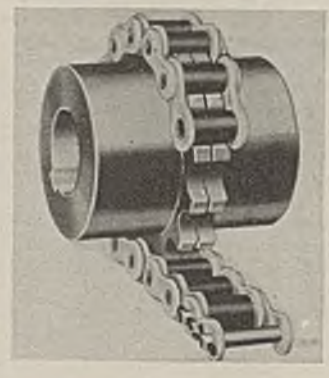
G.E. Magnetic, Full-Voltage Synchronous Motor Controller



Flexible Coupling

A new flexible coupling using the company's "RC" Silverlink roller chain is offered by the Link-Belt Co., Indianapolis, Ind. Designated as the "RC" model, this coupling consists of two cut-tooth sprockets connected by a piece of roller chain. All working surfaces, it is said, are machined to close tolerances, and a pin-and-cotter link makes coupling or removal easy. Where advisable, the coupling can be inclosed in either a stationary or revolving, automatically lubricated, oil-retaining case.

Link-Belt Flexible Coupling



Roofing Base

Brown Co., Portland, Me., now offers the "Solka" base for asphalt shingles and prepared roofings. This base, according to the company, is a tough, flexible material made of interlocked cellulose fibers and gives unusual strength and durability to asphalt roofings. In addition, greater flexibility is assured, it is asserted, and the nail-grip is materially improved, affording protection against wind and storm. Solka base roofings are made and sold by the following: Certain-Teed Products Corporation, Philip Carey Co., Ruberoid Co., McHenry-Millhouse Mfg. Co., Weaver-Wall Co., and others.

Non-Skid Belt

E. F. Houghton & Co., Philadelphia, Pa., offers the "Vim-Tred" leather belt with a non-skid surface produced by indenting a portion of the surface in contact with the pulley. This, according to the company, concentrates the pressure between the belt and the pulley on the ribbed tread, thus increasing the gripping power of the belt. Slippage is eliminated, it is asserted, and the life of the belt is lengthened. Other advantages cited by the company include: reduction of vibration, elimination of swaying, dust and windage; and suitability for short-center drives.

Tread of "Vim-Tred" Leather Belt

Contents, Coal Age for July, 1933

With which is consolidated "The Colliery Engineer" and "Mines and Minerals"

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