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

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### **Evading Rock Costs**

NO ATTEMPT seems to have been made to segregate, either in cost accounting or in special studies, the costs of rock handling in the mine or on the surface, though in many thin seams it is the important item on which success or failure of operation must finally rest. An effort should be made to charge against "Rock" the difference between excavating entries solely in the coal and excavating them in both rock and coal, to charge similarly the cost of stowing the rock in the mine or hauling it to the main hoist-if there be one-and of hoisting and dumping it. The figures doubtless would be appalling, but the cost of heartbreak need .not be added to the total, for it is certain that remedial measures would follow.

Perhaps the rock should be stowed; perhaps it should be brought to the surface, being both loaded and dumped mechanically. The solution may be one that changes with such variables as coal thickness, permanency of gangways, length of haul, and availability of dumping ground. There may be a point where a change should be made, and the superintendent should know when to vary the program. It may be that the entire mine plan should be changed from a fir-tree layout—to use a Teutonic expression—to the panel system, with conveyors in low room headings.

### Paging Tomorrow

ONE outstanding trend in anthracite preparation over the past hundred years has been the reclamation of smaller and smaller sizes from the culm bank as the market for the largest sizes disappeared. Steamboat and lump, once important factors, now belong to history. Egg becomes increasingly difficult to move through the ordinary channels. Even the haughty stove has lost some of its dominance. Perchance the day is not so very far distant when pea will be the largest size for which there is any steady market, and a metamorphosed buckwheat will lead the domestic procession. Certainly both past history and a present consumer trend centered primarily on convenience indicate such a development unless there should be radical changes in the equipment and methods for burning the larger sizes.

That these possibilities are not being overlooked by progressive anthracite management in the design of new preparation plants is borne out by the plans for the Salem Hill breaker of the Haddock Mining Co. Considering egg already well on its way to the commercial graveyard, no provision for making this size is incorporated in the breaker layout. Moreover, standard practice in design has been further modified to permit elimination of the other larger sizes as these seniors slip from commercial senescence into oblivion.

### Even If Constitutional ----

WHETHER the Davis-Kelly bill, if enacted into law, would be constitutional is a question no man can definitely answer until the courts have spoken the last word. But no such indecision need halt judgment on its practical workings. The testimony rolled up against the bill at Washington the past ten weeks too clearly establishes the pitfalls and uncertainties which would confront both the regulating commission and the bituminous coal industry.

Upon one point only does the bill offer clear guidance to the industry. The machinery for compulsory unionization-without, however, any provision for effective control of the union in the public interest—is set out in understandable details. Elsewhere are vagueness and generalities. One day, for example, a sponsor declares that the commission would be empowered to zone distribution; the next, he expresses a willingness to amend the measure to specifically deny that power.

Under the licensing provisions, the prudent company which has built for the future by acquiring reserve acreage may have its investment confiscated by denial of the right to develop such acreage. To make the industry strong and prosperous, it is to be put into the straitjacket of government control, while its competitors continue unhampered and unregulated in the invasion of its markets. This is not stabilization, but strangulation of private initiative with no reasonable hope of compensating gains for the surrender of individual freedom.

### Break the Deadlock!

INCREASING UNEMPLOYMENT is the gravest social and industrial menace facing the country. Employment is at such a low ebb because production of capital goods, which give labor its major opportunity, is only 25 per cent of normal. Production of consumer goods, supported by bare brute necessities and stimulated by volume-winning and value-wrecking sales campaigns, approximates 75 per cent or better, but that level is being undermined steadily by the shrinkage in the movement of capital goods.

Millions could be invested safely in the modernization of many industries—not to increase production but to increase production efficiency and net earnings. Many enterprises cry for the infusion of capital to market new products already developed, which would widen employment and so contribute to a healthy restoration of national buying power. Private industry, however, will undertake no substantial purchases of capital goods unless it can command an assured and plentiful supply of cheap, longterm credit.

Such credit must be made available—even if it becomes necessary to extend the principle underlying the recent loan made by the Reconstruction Finance Corporation to the Pennsylvania Railroad for carrying on its electrification program and supply a moderate amount of government capital for temporary investment to push business off its present dead center. Unless this or other means can be found to put more men back into channels of productive labor, hungry stomachs will compel the diversion of idle capital into an orgy of wasteful spending on unwarranted public works or an expansion of the private dole into a largescale government institution.

### Panel Thin Seams Also

IN THIN BEDS of coal, long room entries of full height, extending from the main gangway to the outcrop or boundary, do not promise maximum profit. The once popular fir-tree layout has lost out to the panel system in thick coal and must soon pass out in thin coal with the intervention of conveyors to assemble and transport coal to distant car-loading points.

Only main and cross headings should be driven high enough for haulage purposes. In general, with a fairly level seam, room headings should be made only of coal height, 1,200 ft. long, and should be driven right and left from the crosss headings, which would be at 2,400-ft. centers. In the room headings, belt conveyors would receive coal from room conveyors and deliver it at the cross entry. Then the high cross headings will be only one-fourth of the length of the present high room headings, cutting rock-handling cost in four, though power and equipment costs would be increased. The cost of hauling and dumping the rock also would be cut in four, if any of it must be hauled and dumped.

Operation would thereby be concentrated, final extraction would be speeded, and better roof falls obtained. A saving in switches and rails would partly compensate for the increase in other equipment. Some means of hauling the men along the room headings might be needed, but a long, low truck might be provided running on a narrow track, on which the men might travel prone. The track would be available also for the transfer of material. By reversing the room conveyors, if these are made reversible, both men and material might be carried up the rooms to the face. Rarely have the possibilities of the new machinery for low workings been reflected in layout as fully and clearly as they should have been.

# MODERNIZING PREPARATION

+ Insures Steady Operation

### In Competitive Market

### By K. R. BIXBY

General Manager Midland Electric Coal Corporation Atkinson, Ill.

VERY operator in the coal stripping industry has been and still is stalked by the specter of obsolete equipment, for, in this age of mechanization, replacement and re-modeling are inevitable if one expects to meet the demands of more exacting markets as well as competition from without the industry.

Cost reduction, always a major factor in coal mining, calls for pioneers who are willing to back their judgment with their dollars, so that the worth-while contributions to operating economies, so vital to the very existence of the industry, can be developed. I say developed because I believe that it is impossible with any array of talent to construct a plant that does not have some inherent weaknesses or lack the necessary flexibility to meet changing conditions. Consequently, the history of experiences in the development of any plant is bound to have its points of general interest as well as specific solutions to unusual problems. Our own plant (originally described in Coal Age, August, 1930, p. 477) is no exception.

Installation of equipment for the operation of the Midland Electric Coal Corporation's property at Atkinson, Ill., was started just at the time the present depression hit the already overdeveloped and undernourished coal industry. Fortunately, we were fortified with modern equipment, good operating conditions, and a natural potential market; yet the radical change at that time wrought a decided difference in market conditions and influenced our own consequent development.

Characteristics of the local field played an important part. In spite of the fact that we had a comparatively thin vein of coal, averaging about 33 in. in thickness, one of the first obstacles encoun-

pregnated with kidney-shaped deposits of pyrites. Manual reduction with heavy sledges was the only immediate available method of preparing this coal. A grating made from railroad rails was placed over the tipple hopper to trap the larger pieces of coal from this reduction. The hopper into which the raw coal from the pit was dumped for delivery to the preparation plant was a large 350-ton concrete bin, the major portion of which was underground. Twenty-seven feet below ground level the converging bottom of this hopper deposited the coal onto the reciprocating feeder supplying the 42-in. belt conveyor to the tipple.

In order to secure proper preparation, it was necessary to reduce the size of the lumps so that the incased sulphur balls would be exposed for removal; next, the acquisition of a contract for railroad fuel entailed the supplying of mine-run coal for stoker-fired engines, which would not contain a lump in excess of 8-in. Some mechanical means for supplanting the expensive manual sledging of lumps was imperative. Consequently, a Pittsburg 72x36-in. doubleroll crusher was purchased. It had the desired capacity and met the require-ment that it be readily adjustable from 6 to 24 in. between the rolls or to any intermediate size of domestic or fuel coal without any interruption in the operation of the crusher.

The logical location for this unit was between the feeder and the conveyor belt. To accommodate it, the hopper pit was excavated 9 ft. deeper and extended so that by reversing the direction of delivery of the feeder and extending the conveyor belt, sufficient headroom was obtained to set the crusher across the belt. This arrangement allowed the feeder to discharge directly into the tered was a preponderance of lumps im- crusher, and permitted the reduced ma- In addition, Homer W. Riley, vice-



Fig. 1-Standard Single-Cell Montgomery Jig Washing 3x2-In. Egg

terial to fall directly onto the extended belt conveyor.

To conserve space and to eliminate degradation, the lip of the feeder was made into a forked bar screen so that the smaller coal could be bypassed. The unusual space between the back wall of the crusher and the breaker plate afforded ample room to bypass the minus-4-in. coal to the conveyor belt. With this type of installation, records show that the resulting degradation was a negligible figure.

The sales problem consists largely of balancing the sizes from the pit-run screen separation with potential market demands. The latter may vary with the seasons of the year or it may have a natural trend toward a particular size. In recent years, several factors, other than the f.o.b. mine price, have con-tributed to an increased demand for screenings. This broadening market for fines offered a solution to our sales problem. Installation of a 30x54-in. single-roll crusher at one end of our mixing conveyor, so that the unsold sizes could be reduced to screenings, was the answer. The deciding factor in the selection of a single-roll crusher was its characteristic reduction without the production of an excess of fines.

The usual objection to single-roll crushers is the percentage of oversize. To offset this, the regular construction was modified to eliminate the long drag teeth on the roll and to provide for the substitution of an ungrooved back plate.



Fig. 2-Construction Details, "Multi-Pulse" Jig

president of the McNally-Pittsburg Manufacturing Corporation, developed a double-lip back plate with an intermediate pocket. This plate was so constructed that the upper lip gave a wider opening than the final lip; the intervening pocket meant that any oversize from the first contact would be trapped and reduced before being discharged.

The above changes permitted us to drift along, operating at capacity without the loss of a single day, from Sept. 21, 1930, until July 21, 1931. On the latter date our washing plant was started. The natural question with this operating record for a background would be, Why the washing plant? Industrial activity was at a lower ebb than at any time since 1914 and it was inevitable that if we expected to hold our market consistently in the face of increasing competition, we would have to be in a position to meet the demand for greater fuel economy.

To meet this demand, we decided to eliminate all extraneous material in our fine sizes by mechanical preparation. There is no logical reason for paying freight on non-combustible material or for defraying the subsequent expense of disposal when it can be eliminated at the mine. Then there was the matter of greater sales possibilities, not only through lowered sales resistance but in the form of orders from industries whose specifications were based on fuel with a uniform analysis.

By a series of preliminary investigations we were able to determine to what extent our product could be improved. Some of these tests were made

by shipping carloads of coal to a washing plant for treatment. Numerous float-and-sink determinations were made, so that we had a fairly comprehensive picture of what we could expect in the way of a washed product. The contract for the installation of the neces-

screen with  $\frac{5}{8}$ -in. square openings, also equipped with a spray at the head. Degradation from the screen goes to the 2x0-in. washing units for salvage, while the 3x2-in. egg is returned to the tipple on the top strand of a drag conveyor. Adjustable gates allow the egg to be loaded on any of the five tracks, either alone or in combination with other sizes, or it may be crushed if desired.

Six Pittsburg "Multi-Pulse" units were installed to clean the 2x0-in. coal at the rate of 245 tons per hour. These units were developed by C. H. J. Patterson, washery engineer, McNally-Pittsburg Manufacturing Corporation, from the basic Montgomery patents incorporating the principles of automatic recirculation of wash water, elimination of back suction by means of flap valves in the sub-sieve plungers, and automatic refuse rejection, controlled by adjustable floats. These floats permit positive control of the refuse bed, so essential to uniform washing. The chief departure from previous practice lies in the multiple-stage arrangement. Each unit consists of four separate cells, two primary and two secondary, with a central Separately controlled refuse space. automatic rejection gates are provided for the primary and secondary stages and a single refuse dewatering elevator serves two units, or a total of eight cells.

The eccentrics actuating the four plungers of each unit are mounted in opposition on a common shaft so as to balance the power demand. The length of stroke is variable through nine dif-



Fig. 3-Midland Electric Preparation Plant

sary washing equipment to treat our minus-3-in. product was let to the McNally-Pittsburg Manufacturing Corporation, then functioning as the "Pittsburg Boiler & Machine Co.," licensee under the Montgomery patents. The total rated capacity of the washing plant is 315 tons per hour.

Two standard 400-ton Montgomery jigs with manually regulated rejection gates were provided for the treatment of 70 tons per hour of 3x2-in. egg coal. The washed egg is delivered to a dewatering elevator equipped with several clear water sprays. This elevator discharges onto a reciprocating wire mesh

ferent positions for each eccentric. Theoretically, there are many possibilities with the "Multi-Pulse" units, as we have already demonstrated by tests with various lengths of strokes for the different cells. At present we are operating the two primary cells with the same length of stroke, about  $4\frac{1}{2}$  in.; the stroke for the third cell somewhat shorter, while in the final cell a very mild impulse is obtained by using a very short stroke, thus giving extremely fine refuse an opportunity to settle out.

The water overflow from the three preceding cells provides a smooth but rapid horizontal surface scouring cur-

rent in this final cell, which prevents large coal already floated to the surface from sinking in face of the gentle impulse. The almost complete elimination of back suction by means of the flap valves in the plungers also assists in making this gentle impulse possible without loss of coal. The greater part of fine material removed in this cell passes through the perforations of the jig sieve and out through the "hutch" compartment into the refuse well through a specially constructed valve. If any large particles of coal should happen to settle in this final cell, they must pass over the heavier impulse of the third cell before they reach the rejection gate. The coal loss, therefore, is minimized.

A 15-hp. motor is provided for each four-cell unit; actual meter demand is 12 hp. This includes the operation of the raw coal feeder, which is actuated from the primary plunger of the unit and automatically discontinues feeding in case the wash unit stops.

Washed coal from each unit discharges onto a high-speed, short-stroke, reciprocating dewatering screen which is built in two balanced sections surfaced with wedge wire screen and provided with high-pressure sprays. The dewatered coal from all six screens discharges into a common collecting conveyor and eventually returns to the auxiliary shaker screen in the original tipple for sizing, mixing, and loading.

The dewatering screens are mounted directly over a concrete settling tank, 16 ft. wide by 63 ft. long; in the

bottom are two longitudinal cast-iron pumps were hooked up in parallel for spiral conveyors. These spirals collect the settlings and deliver them to an elevator well at one end of the tank, from which they are removed by a very slow-speed, continuous-bucket, dewatering elevator, to be discarded with the washery refuse.

Water in the settling tank, after the fines have settled out, flows over a weir 60 ft. long into the water return launder, which returns it to the water wells of the six wash units for automatic recirculation by the pumping action of the plungers.

In considering a wet washing plant, it is necessary that some adequate water supply be available. Our nearest surface supply was the Illinois-Mississippi Canal, about 8,500 ft. distant; this meant, if the supply came from the canal, a remote pumping station with its attendant difficulties. Investigation promised a possible supply in the St. Peter Sandstone about 1,250 ft. below the surface. We sank a deep well to a depth of 1,257 ft., installed a 300-g.p.m. deep-well turbine pump and tested at 380 g.p.m. with a static head 175 ft. below the surface.

Two storage lakes were constructed, one with a capacity of 1,000,000 gal., replenished each night from the deep well, its overflow going to the second lake, of 5,000,000 gal. capacity, which constitutes an emergency reserve. Two high-pressure centrifugal pumps take their supply from the smaller lake for the make-up water, which is added through the clear water sprays. These

volume to the sprays and are so arranged that they may be operated in series, with double the pressure, for clean-out purposes. A large-volume centrifugal pump is stationed at the large lake to refill the system quickly after washouts.

The land in this particular section of Illinois is very flat, so that in order to provide settling facilities for the washery overflow and the emptyings from the tanks after periodical washouts and inspection, we constructed an artificial lake, connected to our washery by 2,100 ft. of 18-in. sewer tile laid on a grade of 0.5 per cent. Manholes were provided every 400 ft. A pump installation at the opposite end of the lake from the tile discharge permits the removal of the clarified water; this allows the discharge from the tile to gorge its way through the deposit, keeping it comparatively level.

It was found after installation that the emptyings from the tanks during washouts were too heavy to force through the tile drain, and equipment was recently installed to deliver this material to the common refuse conveyor. This equipment consists of submerged drag conveyors beneath the hutch compartments of the wash units. These conveyors, running at barely perceptible speed, continuously collect the heavy settlings which unavoidably work back through the hutch valves of such an installation and delivers them into an elevator sump, from which they are removed by a four-speed elevator simi-



lar to the one used with the settling tank. So well is this installation working that system washouts are limited to inspection periods only.

One of the first opportunities to capitalize on the washery investment was the installation of a 7x11-ft. Pittsburg rotary breaker to reduce the quantity of reject from the hand-picked material from the plus 3-in. coal. In this machine these rejects, consisting mostly of coal inlaid with pyrites, are lifted to the top of the 7-ft. revolving cylinder by shelves and then are dropped vertically to the bottom, adjustable deflection plates keeping the material traveling slowly forward. The softer material, most of which is valuable coal, is detached by the impact of the successive drops and passes through the 2-in, perforations in the cylinder, while the heavier refuse matter is not so easily broken and the greater part of it travels forward to the discharge end. The material passing through the screen joins the 2x0-in. feed to the washery.

It happens that the oversize material discharged from the breaker consists predominantly of pyrites. This product is hand picked and the pure pyrites are loaded and sold to smelters for the recovery of the sulphur. We have a capacity of approximately 100 tons of this material per day. At present, however, the market is not absorbing it at that rate. The material picked out by hand in preparing this pyritic product is chiefly laminated in structure and contains a considerable quantity of coal, which warranted the installation of a roll crusher in which this material is reduced to 2 in. before being sent to the washerv for salvage.

It was assumed originally that the fine material from the washery passing through the 11-mm. wedge wire of the dewatering screens would be valueless, but after beginning operation it became evident that washing had become was 1.1 per cent in excess of the posmarkedly beneficial even in the extremely fine sizes. An exhaustive series cleaned product had an ash content 0.02

it, which could be combined with the jects will give a fair example of how washed product without noticeably increasing the ash content. A plant for treating this minus-11-mm. material, consisting of a small Rheolaveur washer and a specially constructed, high-speed dewatering screen, went into operation early in June.

In order that proper conclusions might be drawn and developments governed accordingly, we established a laboratory at the time of our washing plant installation. The services of a competent and experienced chemist were secured, whose duty it was to analyze raw feed, clean coal, and refuse. As a result, several changes have been made and others contemplated. We were able to determine that our pyrites average 46 per cent sulphur, justifying their purchase by the smelters to supply the sulphuric acid market.

Regardless of the fact that careful specific gravity tests and a thorough knowledge of the characteristics of a particular seam of coal may give the theoretical washing possibilities with a given washing plant, results in actual practice depend on the skill of the operator. In spite of these factors, it is often surprising how close one can approach the results indicated by the specific gravity analyses. Numerous checks on performance are necessary to keep the operation within prescribed limitations. A test made on Oct. 27 showed that we were washing our 3x2-in. egg coal at an approximate specific gravity of 1.40. At this gravity, we should have a theoretical recovery of 88.8 per cent of the weight of the raw coal feed. We were actually recovering 88.7 per cent and were producing a clean product that contained only 0.05 per cent over the theoretical ash content. On the same date a test was made of the 2 in. x  $1\frac{1}{2}$  mm. washed coal, showing that our loss by weight sible theoretical recovery, and that the of tests indicated that we could re-treat per cent greater than the theoretical. A more firmly intrenched than e this product and salvage 54 per cent of study of the floats and sinks of the re- good graces of our customers.

Surger of  closely the operation is being controlled:

Date	Size, inches	Float at 1.45 s.g., per cent	Sink at 1.45 s.g., per cent
Sept. 22, 1931	2x0	3.8	96.2
Nov. 16, 1931	2x0	2.2	97.8
Dec. 15, 1931	2x0	5.1	94.9
		Float at 1.40 s.g., per cent	Sink at 1.40 s.g., per cent
Nov. 14, 1931	3x 2	2.7	97.3
Dec. 23, 1931	3x 2	5.2	94.8

A comparison of analyses of raw coal, cleaned coal soon after the starting of the plant, and present results follows:

Raw Coal (14 in, x 14 mm.)	As received,	Dry basis, per cent
Moisture. Ash. Sulpbur. B.t.u.	14.00 11.70 3.77 10,377	13.60 4.38 12,066
Washed Coal (early analysis)	As received, per cent	Dry basis, per cent
Moisture Ash Sulphur B.t.u.	. 17.9 . 9.4 . 3.6 . 10,610	11.4 4.4 12,930
Washed Coal (present analysis)	As received, per cent	Dry basis. per cent
Moisture. Ash. Sulphur. B.t.u.	. 17.6 . 7.0 . 2.9 . 11,000	8.5 3.5 13,350

When one considers that prior to the washing of the coal no attempt was made to clean the minus-2-in. coal, and that there would be a loss in this size of from 20 to 30 per cent by washing, what has been accomplished by the installation of the rattler and the auxiliary crusher can readily be appreciated when it is known that our total loss from all sizes has been reduced 1.97 per cent since the installation of the washery. It is estimated that this loss will be reduced an additional 5 per cent upon completion of the re-treatment plant for the tank settlings. Surface moisture is controlled to the extent that there is practically no drippage from cars after loading, even in the 11 in. x 11 mm. size.

It might be timely to add that we have not lost any prestige through the washing of our coal, as we have worked to capacity every regular working day since the inauguration of our washing plant, and I am positive that we are now more firmly intrenched than ever in the

Fig. 5-Looking Along Dewatering Screen Toward "Multi-Pulse" Jig





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# BACKFILL AT HALLSTEAD

### + Behind Permeable Barriers

THE PROBLEM of supporting overlying strata or surface incident to the total extraction of the coal or other mineral has been a most perplexing problem to the mine operator. Under the best known methods, absolute freedom from ultimate surface subsidence cannot be guaranteed. Among means commonly employed for such support in the anthracite field are rock packing, cogging and flushing. Those acquainted with the first two methods will readily appreciate that, with either of them, it is almost impossible to obtain satisfactory support.

Where flushing material, such as gravel, and and refuse, is available, and such material can be conveyed to the area to be filled, flushing appears to be the most satisfactory form of backfilling, not only from the viewpoint of cost but also from that of efficient surface support. Under the most ideal conditions the voids can sometimes be almost completely filled. One would naturally conclude that under such conditions there would be practically no surface subsidence.

Experience has shown, however, that at depth of 1,000 or more feet a subsidence equal to 10 per cent of the thickness of the bed will ultimately take place even with the best filling methods and materials. As is readily appreciated, even with the finest of backfilling, such as sand and gravel, there are appreciable voids between individual particles. The great pressure of the overlying strata will have a tendency to reduce the bulk of flushed material. Therefore, no matter how well an area has been filled, if the depth of such area is 1,000 or more feet below the surface, one can look for an ultimate subsidence of at least 10 per cent of the thickness of the bed, due to the squeezing of material into the so-called inherent voids of the backfill.

Mines have been flushed in Europe at depths of 2,500 ft. or more below the surface, and it has been found that the 10-per cent rule applies to any depth beyond 1,000 ft. That is to say, at that depth the compressibility of the flushing material may be said to reach its limit, so that even at a depth of 2,500 ft. the subsidence will not exceed 10 per cent, provided, of course, that the area has been completely filled and that the best filling material has been used.

The general practice in the anthracite field has been to build a heavy and substantial battery at the foot of each chamber or opening to be flushed, and to permit the flushing material to rest against the battery, provision being made for overflow, whereby excess water will be carried away. In this case, the battery served principally as a dam against the hydrostatic head. The basic principle of the method to be de-

Chamber workings in an anthracite mine have been flushed without the use of substantially built batteries by the aid of light props, chicken wire and burlap, which will hold all but the finest material and allow the water to drain off. The system proved successful, but certain unfavorable circumstances caused a cessation of the experiment. The pillar coal was recovered in its entirety by skipping one-half of the pillar and then extracting the other half, in each case starting from the lower end.

scribed in this article is entirely at variance with such methods. In the method to be described, the purpose is to avoid building up a hydrostatic head by ridding the flushing material of water as soon as it is deposited in the chamber.

As far as is known, flushing by the use of burlap and chicken wire was first tried in the anthracite field at the Hallstead colliery of the Glen Alden Coal Co. This colliery is situated in Duryea Borough, Luzerne County, approximately 8 miles south of the city of By S. D. DIMMICK

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Scranton. The colliery has operations on both sides of the Lackawanna River. For a considerable distance on each side of the present banks of the river is a surface wash consisting of very fine sand and gravel, which extends to a maximum depth of about 50 ft. This wash undoubtedly represents the old bed of the Lackawanna River during prehistoric times.

Because the river flows back over a large portion of the surface of this permeable wash during high water, the mining of the surface bed and of the outcrops of the lower beds presents a very difficult problem. Overlying the "surface," or Marcy, bed is a slaty sandstone stratum, 30 to 40 ft. thick. The Marcy bed itself is approximately 8 ft. thick and contains several benches of bad bone, which, in first mining, was gobbed in the chambers. The particular area of the Marcy bed in which this flushing method was tried is known as the Feederdam section of the Hallstead colliery and lies underneath the river flats, which, during high water, become inundated.

The surface wash in itself offers practically no resistance to the entrance of water, which accordingly leaks into the mines in large quantity. The first mining was done in the usual manner by driving 24-ft. chambers on 45-ft. centers. In first mining, no unusual conditions were encountered except that much water seeped in through the cracks in the roof during heavy rainstorms or high water.

In fact, much trouble was expericnced from water, not only when the river during floods actually covered the surface but also when the river arose but did not overflow its banks, for the sandy river bank permitted the water to permeate through the sand and rise to practically river level. Incidentally, it may be said that when the Marcy bed was first opened the danger from flooding seemed so imminent that flood doors were installed to prevent the water from reaching the lower workings of the Hallstead colliery, should the roof of the Marcy bed at any time break through. Fortunately, these flood doors have never had to be used.

When the time came to extract the pillars in the Marcy bed in the area affected by the river, it was recognized that it would be hazardous to cause a large break in the rock strata between the bed and the surface wash. The company, therefore, was hesitant in adopting any filling method, such as rock packing, which would not properly support the rock strata. Not far removed from the area under discussion were several large hills of fine sand and gravel. It was concluded that this would make an ideal filling material.

Knowing of the success of the burlap and chicken-wire method of filling, the company decided to experiment with this method in the Marcy bed. Consequently, boreholes were sunk to the coal bed at convenient points through which the sand material could be flushed. Sand was loosened from the hills by hydraulicking, but the transportation of sand and gravel from bank to boreholes gave much trouble because or the low gradient between these two points.

The chambers in the Marcy bed pitched at an angle of about 8 deg. Light props of 5- to 6-in, diameter, at about 5-ft. centers, were set in a line on one side of the chamber at a distance of 21 to 3 ft. from the side of the pillar. On the side of the props opposite the rib, chicken wire of about 1-in. mesh was nailed. The usual 2-in. mesh chicken wire was tried, but found unsuited to the purpose. Lines of boards also were nailed to the props under the roof and on the bottom. Burlap of the type commonly known as onion sacking. because it resembles the material in which onions usually are shipped, was nailed to the top and bottom boards.

When this work was first started, it was thought well to use burlap of fine mesh so as to retain as much as possible of the fine sand, but it was found that when the burlap was close knit the fibers swelled and prevented the immediate discharge of the water, setting up a sufficient hydrostatic head to cause frequent breaks in burlap and wire mesh. After many experiments it was finally decided that large-mesh burlap was best suited for the purpose.

It was, of course, necessary also to block off with chicken wire and burlap the crossent on the opposite side of the chamber. The space between the burlap barrier and the side of the pillar, which, as above stated, was about 24 to 3 it, wide, served as a traveling way and also permitted the water to escape from the burlap.

In some cases, at the foot of the chamber, gob was piled to the roof and burbap placed over it, thus replacing by permeable material, that would not re-



S. D. Dimmick

tain water, the heavy batteries formerly used. In other cases where gob could not be piled at the foot of the chamber, props, chicken wire and burlap were used in the manner already described. In Europe it is customary to pile branches and brush at the foot of the chamber, the whole then being covered with burlap.

The sandy material was conveyed to the foot of the chamber by wood pipe, the end of which was always kept as far from the burlap as possible. It was found that the water immediately left the mixture and found its way through the burlap. Because the sand was fine, the water carried some of it through the meshes. This sand later was deposited in chambers on a lower level, where it will serve as filling material for future mining.

Water finally reaching the pumps was absolutely clear and free from sand, as was evidenced by the fact that no unusual repairs had to be made to the centrifugal pumps by which it was returned to the surface. Unfortunately, the sandy material was inter-stratified with bands of sticky clay, which by stopping up the holes in the burlap usually prevented the sand from running through it on low gradients. A more ideal filling material would be a sand of larger grain and fine gravel, but no such material was available at Hallstead colhery. As the breaker was a mile away from the operation, crushed refuse from the breaker could not be used.

As soon as flushing of the chamber was completed, the driving of a skip, one-balf the width of the pillar, was started from the lower end up. As soon as the skip had been driven the full length of the pillar, a line of props was set up 2½ to 3 ft, away from its new thank, and the space opened by the removal of the skip was then flushed, just as the chamber itself had been. The rest of the pillar was extracted from the lower end up, as this space was being flushed. Finally, the area formerly occupied by this last half pillar was flushed with sand, thus completing the filling of the entire area.

In Europe, where this method is extensively used, the props, chicken wire and burlap used in the flushing of the chamber are customarily removed and re-used for further flushing. As the work at Hallstead was experimental, and for other reasons, it was found impractical to use the material more than once. The props, burlap and chicken wire used in each operation, therefore, were left in place.

A total area of about 12 acres was treated in this manner, and it was found that the average surface subsidence did not exceed 6 in. It already has been noted that European experience has developed the fact that a subsidence of 10 per cent of the thickness of the bed may be expected at depths of 1,000 ft. or more. If the Marcy bed had been 1,000 ft. below the surface, the subsidence would have been, according to European experience, about 10 in. The actual subsidence of 6 in., therefore, was approximately what might have been expected with a bed located at the depth of the Marcy.

From the standpoint of surface support, the chicken wire-burlap method of flushing cannot be criticized. Due, however, to certain conditions at Hallstead colliery, among which was the fineness of the sandy material, the difficulty of transporting this material to the boreholes, the presence of large benches of mud in the sand, the fact that all of props and material had to be carried up the pitches, and the high cost of mining due to the large percentage of refuse in the bed, it was found that the ultimate cost of recovering the coal was so high as to make the undertaking unprofitable. Incidentally, the Hallstead colliery is a small operation comprising many areas of high cost. Moreover, it probably is the wettest operation of its size in the anthracite field.

Operations, therefore, were stopped, not because the method was not practicable but because of the peculiar conditions surrounding the Hallstead colliery. It is believed that if proper flushing material were available, such as crushed breaker refuse, coarse sand and gravel, and there was little difficulty in transporting this material from the source of supply to the chambers, this method would be practicable and of low cost.

Like every other method of its kind, it will not suit all conditions, but the operators of the Hallstead colliery are satisfied that the method is well worth trying where circumstances are more favorable. The principal matters to bear in mind are that there should be no hydrostatic head behind the burlap, and that suitable provision should be made to make use of the sandy material which will naturally flow out with the water.

# **COST-REDUCTION ROADS**

### + Explored by Operating Men

### At Cincinnati Convention

OST-REDUCTION PROGRAMS legislation. It was their view that the as the shortest road to increased net earnings under existing industrial and financial conditions dominated the Ninth Annual Convention of Practical Coal Operating Men and National Exposition of Mining Equipment held under the auspices of the Manufacturers' Division of the American Mining Congress at the Music Hall, Cincinnati, Ohio, May 2-6. As in the past, savings effected through underground mechanization loomed large in the program, but opportunities for lower costs and greater efficiency in other phases of the operating cycle also had a prominent place.

Discussion of the broader economic problems of the industry centered around proposed legislation to bring bituminous mining under federal control. Originally scheduled as a meeting to consider stabilization proposals, the final session of the convention on the morning of May 6, presided over by R. M. Shepherd, president, Allegheny River Mining Co., Kittanning, Pa., developed into an attack upon the Davis-Kelly and Lewis bills with J. D. A. Morrow, president, Pittsburgh Coal Co., Pittsburgh, Pa., and J. G. Bradley, president, Elk River Coal & Lumber Co., Dundon, W. Va., leading the opposition to the measures now before Congress. This attack had been foreshadowed earlier in the week when the operator delegates and the Manufacturers' Division had adopted resolutions registering their disapproval of the proposed legislation

Operating men, in a resolution adopted May 3 and sent to the Senate subcommittee on Mines and Mining, declared that the proponents of the Davis-Kelly bill represented neither the owners and producers of coal, the railroads nor the consumers, but only 10 to 15 per cent of the labor engaged in mining. They also insisted that the subcommittee deny the request of the United Mine Workers to limit hearings on the bill. The manufacturers' resolution expressed doubt as to the constitutionality of the proposed

bill, if enacted into law, would be an unwarranted and dangerous extension of government regulation, would add to the tax burdens of the nation by creating a new commission and would foster and encourage industrial strife.

No coal problem justifying federal interference exists, asserted Mr. Bradley. The industry is on short time, profits are low or non-existent, but in time deflation will correct these difficulties without governmental action. He appealed to operators who had bad or high-cost coal or mines so ill-managed as to be perennially in the red to accept the inevitable, fade out of the picture. and not to injure their fellows by holding on in the vain hope of a comeback. All the troubles of the industry, he said, have arisen from outside influence and from inadequate transportation service. The United Mine Workers, now representing less than 12 per cent of the bituminous employees, has never made any contribution to the solution of the industry's problems, but has promoted decreasing efficiency just when efficiency is more vital than ever because of the competition of substitute fuels.

Regulation, he insisted. means higher prices. Under government control, the fuel bill of the American people might easily be boosted \$500,000,000 to \$1,000,-000,000 per year. Regulation of other industries has resulted in higher prices to the public; why expect coal to be an exception? High prices can be as ruinous as low; it was the high war and post-war prices which encouraged the consumer to economize and to turn to substitute fuels. All the Davis-Kelly bill has to offer the operator is the right to form pools-a right which he already has-and asks him to pay for that right by accepting the domination of the United Mine Workers.

A most reprehensible measure and more vicious than any other ever introduced, was Mr. Morrow's characterization of the bill. It had been presented without the authors having discussed its

terms with competent men in the industry and the suggestions of leaders who had journeyed to Washington to appear before the Senate subcommittee had been ignored by the proponents of the measure. Nothing is wrong with the industry, he continued, except the inevitable workings of the law of supply and demand, which can neither be evaded nor frustrated by federal interference. If, like the public utilities, certain coal companies could obtain a monopoly of particular markets, they might find such an arrangement helpful; but, as a practical matter, that was out of the question.

Left to itself, prophesied E. W. Parker, Bureau of Information, Anthracite Institute, Philadelphia, Pa., who spoke at the Monday morning session, the anthracite industry will emerge from its Slough of Despond. State and federal governments, commissions of many kinds and judicial bodies all have taken part in the investigation and regulation of the hard-coal industry-and only increases in costs have resulted from their operations. Consumers have gained nothing and the producers have suffered. Wage rates from 1913 to 1923 nearly trebled, taxes quintupled, and prices a little more than doubled-thanks to regulation and investigation !

R. C. Becker, McGraw-Hill Publish-ing Co., New York City, was elected chairman of the Manufacturers' Division, succeeding Charles C. Whaley, Myers-Whaley Co., Knoxville, Tenn. I. T. Ryan, Mine Safety Appliances Co., Pittsburgh, Pa., was moved up from second to first vice-chairman, and George R. Delamater, W. S. Tyler Co., Cleveland, Ohio, was advanced to second vice-chairman. C. B. Officer, Sullivan Machinery Co., Chicago, was elected third vice-chairman. W. S. Richards, A. Leschen & Sons Rope Co., St. Louis, Mo.; W. E. Goodman, Goodman Manu-facturing Co., Chicago; and R. L. Twitchell, Carnegie Steel Co., Pittsburgh, Pa., were elected members of the board of directors, vice C. L. Herbster, Hockensmith Wheel & Mine Car Co., Penn, Pa., F. J. Maple, John A. Roeb-ling's Sons Co., Trenton, N. J.; and Mr. Whaley. James A. Callbreath, secretary, American Mining Congress, and Mrs. E. R. Coombes, convention manager, are ex-officio members of the hund.

A Scottish breakfast was served on May 4 to George C. McFadden, assistant vice-president, Peabody Coal Co., in appreciation of his services as chairman of the program committee. Evening entertainment features included a lecture film on "Romance in the Commonplace" by Prof. Norman McClintock, formerly chief photo-biologist, Koppers Research Corporation, and a scientific demonstration on " Electrons at Work and at Play," staged by Dr. Phillips Thomas, Westinghouse Electric & Manufacturing Co., on May 2: an intriguing "Our Gang" show recruited from the ranks of the exhibitors, with W. D. Turnball, of Westinghouse, as impresario, on May 3; and the inforwal dinner dance on May 5, with J. T. Ryan as tousomaster, followed by "Magic vs. Science," a demonstration and talking film put on by William A. Gluesing and E. S. Darlington, General Electric Co.

As might have been expected, the effect of the general industrial depression was sharply reflected both in the number of exhibits and in the attendance. According to figures released at Cincinnati, the attendance from the coal groups approximated 725, as compared with over 1,400 last year. The manufacturers' representation, over 1,000 in 1931, suifered a still sharper reduction in numbers. As in the past, the largest single delegation was from the Standard Coal Co., of Indiana. This organization, which has made it a practice to bring practically its entire mine force to Cincinnati, had approximately 80 men at the show.

A description of the new equipment exhibited appears on pages 243-247 of this issue

### Setting the Stage for Economies

eral manager of fuel more operations, at failed between 1925 and 1930 inclusive, the opening meeting of the technical sessices, presided over by P. C. Thomas, vice-pressident, Koppers Coul Co., Pittsburgh, Pa., on May 2. As much coal is being mined from two machine-looking places as from twenty hand-leading places, thereby saving truck truck maintenance and timber, while affording a better power supply. This restriction of operating area makes it possible to cat and lead out the imparities before showing, with the result that the coal is artsully far clearer than it was when hamimined. More haves and more explosive net recessive under this weaked, but the percentage of hump is not decreased. because the coal does not have to be Shot and within these

Only did per cent of the accidents at Dervety in the past six years have striction pailous surfaces at issues In 1962, there were no accidents in consection with the use of the leading machines it the Na 2 mine, but there were Il accidents among workers engaged in mus-mains although the production ret mut in the machine was dealid that it the hund Amilers.

De making soles asserted N G Alimi of Excession Alimi & Hois Flashingh Pa. man operators and estimating cases without beinghouts for first a 24. Antonioù 31 Antonioù over ST AN AN of capital cast is inners every your as the consumer. Flures became hundraph her after a sule mans are extended quarterly. A time-

LOADING MACHINES at the of its depreciated production cost, the Dorothy (W. Va.) mines of the Chesapeake & Ohio Ky, are earning over 200 per cent per year despite irregular running time, said H. R. Husband, gen-



#### Reni C. Saker

production was continued after the failtare in 51 cases and 90 out of 221 mints in this class were kept in operation.

The randage of narrow work is forecast every three months to halance the advance of wide work in the mines of the Hanna Coal Co., said R. L. Ireland, It., vice-president of the Hanna comrange. Cleveland, Ohio, in a paper read by J. A. Long, general manager, Woodward Iron Co., Wordward, Ala. Mine

be done in a day's run. From these studies, the advance per quarter is calculated and the narrow work needed for that wide-work advance is determined. This the foremen are not allowed to exceed. Projections are made in the engineer's office because nowhere else could they be prepared with the needed accuracy.

Power distribution must be changed every time there is a major readjustment of working conditions if full efficiency is to be realized, declared Carl Lee, electrical engineer, Peabody Coal Co., Chicago, at the Monday afternoon session, presided over by M. D. Cooper, assistant general superintendent, Hillman Coal & Coke Co., Pittsburgh, Pa. Neither minimum requirements nor first cost alone should be the determining factor: the decision should embrace consideration of production losses, power losses, increases in maintenance from low-voltage operations and fixed charges.

Mr. Lee illustrated his argument with a simple case of a mechanized section 10,000 ft, from the source of power, with a load of 1,002 kp., employing 45 men and producing 2,000 tons per day. With the power loading at 50 per cent of the rating, including theostat losses, and line losses 400 kw., the money loss in 300 working days easily might amount to \$23,400 for power and \$18,-000 for maintenance of electrical equipment. Such losses, he said, can be reduced, but money must be spent upon improvement to effect the reductions.

This is where the economics of the situation enters. Losses must be set against the cost of the improvement and the reductions thereby effected. In the improvement for a standard of voltage at the face, the largest item is coppera fixed charge which, at 15 per cent annual rate, for overcoming a 400-kw. loss in a 10.000-it. circuit, delivery at 250 roles will cost \$8,900 per year. Totals of all money losses plus fixed charges will indicate what voltage should be maintained.

Continuing his illustration, Mr. Lee stated that on a working schedule of 50 days per year, 200 volts at the face would be the most economical; for a Militar morning schedule 225 rolts would be the cheapest. Feeder requirements for the lower voltage would be 5,500,000 circ. mil; for the higher, 7,-500,000 circ. mil. Installation of such ieeders, however, wood involve such a large extenditure that the economics of the situation points to an additional substation.

With substation equipment, borehole and station room costing approximately \$16,000, the line at 50c. per foot, copper at 15c. per pound, and line loss 6 per cent, fixed charges on the 400-kw. station would be \$3,038.50 per annum if the transmission distance was 2.50 of the purperty for 15 per cent or less study engineer accertains just what can ft., and \$4,010 if the distance was 10,00

ft., with depreciation at 15 per cent. For a 300-day schedule under the conditions outlined, such an investment would show a saving of 2c. per ton and on a 50-day schedule 6c. per ton over the most economical feeder size without a substation.

Safety should be the first consideration in any underground electrical problem, declared W. E. Wolfe, electrical engineer, Clinchfield Coal Corporation, Dante, Va. No installation is justified unless its inherent hazards have been guarded against-even, perhaps, at the sacrifice of both electrical and mechanical efficiency.

Answering Van B. Stith, superintendent, Anchor Coal Co., Highcoal, W. Va., whether, under ordinary conditions, 10,000 ft. should be the limit of transmission distance, Mr. Lee stated that for light loads and long distances copper usually will prove cheaper than a substation in keeping down losses. It may be economical, however, to install a substation at 5,000 ft, when the load is heavy.

Whether to preserve mine timbers by treatment can be answered only in dollars and cents, said Paul Weir, vicepresident, Bell & Zoller Coal & Mining Co., Centralia, Ill. Too often the tend-ency has been to use timbers with a cross-sectional area larger than necessary for the load supported. Since treatment preserves the original strength, smaller timbers may be used. For example, a 5x7-in. treated tie might well replace an untreated 6x8-in. This is an important consideration, as the cost of treatment varies as the cubic content of the piece. Determination of tolerance is another point that bears watching, as close tolerances may represent 10 to 20 per cent of the prices quoted. More liberal tolerances should be recognized. Bell & Zoller now successfully use untreated timbers of 6 to 7-in. tip, where formerly timbers of 8 to 10-in. at the small end were used. Another consideration worth scrutiny is that short-notice buying stiffens prices.

In a written discussion on the subject by Fred A. Graf, Union Pacific Coal Co., read by I. N. Bayless, assistant general manager of the company, Rock Springs, Wyo., the point was made that a program of timber preservation can be carried out economically if guesswork is eliminated. Treatment may not pay where timber is installed for short service, where the roof is heavy, or where no rot is observed. For treatment at the mines, Mr. Graf strongly recommended the vacuum system. A unit of that type can be purchased for \$5,000 to \$6,000 and the depreciation rate on it should not exceed 10 per cent per year.

High freight rates encourage treatment at the mines. Another factor in favor of mine treatment is the control which the operator then has over the choice of preservative salts or oils. Mr. Graf was opposed to the use of



creosote below ground. Zinc chloride, too, was not wholly desirable, because it leaches out and then reacts to form hydrochloric acid, which attacks the rails. Wolman salts, in his opinion, gives better results.

Arc welding clips hours and sometimes days from delays to large stripping shovels, said a paper by A. E. Steiger, general superintendent, Pyramid Coal Corporation, Pinckneyville, Ill. With arc welding, shovel parts usually can be repaired without tearing down the machine. In addition, the life of parts exposed to heavy duty, such as dipper teeth and sheaves, is prolonged.

Welding, remarked Mr. Lee, has opened a new field for economy in the repair and reclamation of broken parts, in the building up of structural steel bases and in the making of new parts. In 1931, his company, it was estimated, saved \$139,000 by the use of arc welding at 25 mines producing approximately 10,000,000 tons. Where high tensile strength must be maintained, however, Mr. Lee frowned upon arc welding.

Oxyacetylene cutting frequently is cheaper than drilling, stated E. S. Wade, superintendent, Windsor Power House Coal Co., Windsor Heights, W. Va., in a paper read by F. A. Miller, mining engineer, Franklin County Coal Co., Herrin, Ill. At Mr. Wade's operation, mine-pump bearings are rebabbitted in place, and the welding system also is widely used for reclaiming old pipes

where joints cannot be unscrewed. In most cases, the welding equipment is taken to the job.

Behind any substitution of new types and new materials for old, said R. E. Hobart, mechanical superintendent, Lehigh Navigation Coal Co., Lansford, Pa., should lie the idea of reducing costs. At the Cranberry colliery of his company, where free acid plus acid salts varies from 800 to 1,000 parts per million, high-grade metals have demonstrated their value in a number of ways. In tests on materials for screening small coal, perforated steel plate showed a life of approximately 40 hours; manganese bronze, 250 hours; and 12-16 chrome, 400 hours. The relative costs of these different metals in service, taking into account the expense of changing, but disregarding any salvage, were 1.000, 0.755 and 0.503, respectively.

Rapid substitution of chrome steels for other metals, he added, is taking place where abrasion and acid destroy contacted surfaces, such as in jig plates and grates, stationary dewatering screens, chute plates, piping, pump lining and impellers. A service record showed that chrome-carbon steel in centrifugal pump impellers lasted 2,100 hours, and manganese, 320 hours, with relative costs in service of 0.384 and 1,000, respectively.

Hard and soft rubber are gaining in mine use, declared Mr. Hobart. Soit rubber can be handled easily and needs no elbows. Hard rubber should not be used for carrying water which contains grits. On concentrating tables, rubber covers and strips show up better than linoleum or wood, except on tables handling the smaller fines, where linoleum has the edge. The Lehigh company has found that the addition of 2 per cent nickel shot and 1 per cent ferrochrome to ordinary cast iron increases the wearing quality over ordinary cast from 4 to 1 in chute plates. Experiments with aluminum indicate that aluminum resists washwater corrosion five times as well as steel.

### Machines Point Way to Profits

ture was made clear in a paper by R. H. Morris, general manager, Gauley Mountain Coal Co., Ansted, W. Va., at the Tuesday morning session of the Ninth Annual Convention of Practical Coal Operating Men. presided over by Mr. Bayless. Mobile machines were touched upon in another paper later in the morning and again at the afternoon session of the following day (May 4), was changed to 50-ft. rooms on 60-ft. presided over by Thomas G. Fear, gen-eral manager of operations, Consolida-and avoid the dangers of pillar draw-

THAT CONVEYORS have a dis-tinct place in the mechanization pic-mounted cutting machines also had a prominent place in the latter meeting.

In mining 40- to 42-in. cosl, said Mr. Morris, the Gauley Mountain company uses flight conveyors and 12-ft. face convevors. Entries are driven 28 ft. wide to provide the maximum permissible task and gobbing space for rock taken. Originally rooms were driven 35 ft. wide on 60-ft. centers, but this the advance, during which operation the long conveyor is kept close to the remaining stumps. Results for 1929 showed a labor cost per ton 86 per cent of that for hand methods for the entire mine, with general labor charges allocated equitably to all tonnage. Later results showed that this conveyor mining labor cost could be further reduced 22 per cent (see Coal Age, Vol. 35, p. 142, for details of this operation).

The performance of portable hoists in thin-seam coal in central Pennsylvania was recorded by A. E. Roberts, chief engineer, Monroe Coal Mining Co., Revice, Pa. In the operation covered in Mr. Roberts' paper, grades vary from 2 to 17 per cent, both in favor of and against the loads. Each room, room heading, and aircourse is provided with a hoist. These units are operated by the coal loaders. Gathering is done by 13-ton locomotives handling 35- to 45car trips. Average daily output per loader in 1931 was 9.8 tons; for all employees, 5.79 tons. Each hoist handles approximately 13 cars per day, or 4,300 tors per year.

Last year, working 254 days, the mine produced over 800,000 tons. This output was gathered and hauled by 190 hoists and 11 locomotives. Recent experiments showed that, when conditions required, rooms can be driven to the dip by using top-cutting machines and taking pillars back at a worth-while saving in the cost of setting up hoists and of 75 per cent in the cost of the rope. Maintenance cost per unit was \$15.00 in 1926; \$15.65 in 1927; \$21.60 in 1928: \$15.00 again in 1929: \$12.00 in 1930, and \$18.00 last year. The increase in 1931 was attributed to unusually large controller replacements.

How a mine abandoned in 1925 because root conditions were too bad for economical mining by orthodox hand methods was brought back into production with shaking conveyors was de-scribed by C. A. Griffith, vice-president, Fruden (Tenn.) Coal & Coke Co. This mine works a seam 30 to 42 in thick. although rolls in some parts reduce the beight to as little as 18 in. The coal is worked by long faces with conveyors and seed jacks; development work is done with a mobile loader handling coal and pock alternately (see Coul Age. Vol. 35, p. 234 ; Vol. 37, p. 185). Answering a question by A. R. Gordon, mining engineer, Stonega Coke & Coal Co., Big Some Gap, Va., Mr. Griffich said that the conveyors handle coal on a maximum adverse grade of 21 per cent. Rollies are insected in the trough.

Developments in strip mining in the Suttimest were reviewed by L. Russell Kelce, vice-president and general manager, Hume-Sinclair Coal Co., Kansas City Mo. Some plants, he said, are using brucks for handing coal out of the pile in same insumes these are Pools or Chevories with a side-champ

ing. Pillars now are honeycombed in semi-trailer. The largest trucks, when loaded, may weigh as much as 14 tons. The cost of such haulage generally is cheaper than track haulage, because track maintenance expense is eliminated. The next major step in stripping developments, Mr. Kelce believed, will be large-scale installation of mechanical cleaning plants.

Because of inherent differences in natural conditions governing mine operations, there are distinct limits to standardization of equipment, declared L. W. Householder, vice-president, Rochester & Pittsburgh Coal Co., Indiana, Pa., at the Wednesday afternoon session. Special problems call for special study. With these convictions, his company some years ago called upon

Pa., does not worry the Rochester & Pittsburgh company because "about 40 per cent of our output goes to the pulverized-fuel and byproduct markets."

Mr. Fear, remarking that this was the first case of coal being cut without cost, wanted to know whether it was necessary to have a crew behind the machine to service it. The entire crew, answered Mr. Householder, consists of three men with an old locomotive. This crew cuts 350 to 400 tons per shift in 5-ft. coal and each man earns \$7 to \$8 per day. If a higher percentage of lump is a desideratum, however, then Mr. Householder suggested experimentation with other types of equipment, such as the coal saw.

Continuity of operation begets low



an equipment manufacturer to develop a new type of machine which would cut and simultaneously remove the cuttings from the kerf and transfer them to a car or gob. After many months of study and consultation, the machine was developed to its present state.

The machine, explained Mr. Householder, conquered several difficult problems in cutting and loading coal at an operation in the double Freeport seam. In the mine in question, there is a 3-in. band of cannel at the roof, followed downward by 6 in of high ash-sulphur ceal 15 in of quality coal, 15 in of slate binder, and 40 in. of high-grade coal. Orthodox methods of top cutting gave a satisfactory product, but at the cost of much extra work. Addition of a second cutting bar to the new machine, however, increased the cutting width to 12 in. and allows all but a iew inches of coal in the top bench to be cut out and loaded as one operation. The bar is then lowered to the slateband horizon and this impurity is cut out as a second operation, leaving clean coal to be mined out by usual methods.

This system has effected savings of 7 to 12c. ver ton. In several instances. the machine has paid for itself in one to two years. As the standard loading race is guid for the output of this machine, the cost for cutting actually has been eliminated. An increased percentage of fines, the speaker told Joseph Persylove. Jr., engineer, Pittsburgh Terminal Coal Corporation, Pittsburgh,

mining costs with mobile loaders, said W. J. Jenkins, president, Consolidated Coal Co. of St. Louis, St. Louis, Mo. The criterion of maximum efficiency is peak operation of main-line locomotives. Partings should hold enough cars to keep loaders supplied for an hour. Voltage at the face in the mines of this company in Illinois is not permitted to drop below 260.

Maintenance crews are regarded as the most highly specialized of all plant workers, and must be, because a machine delay of one minute means a loss of \$1. Each machine is inspected by trained men four times each shift. Repair crews engaged in overhauling in the shop drop that work to give attention to machines at the face. If the delay is short, the operating crew will stay with the machine; if not, the operating crew is transferred to a spare section of the mine which is constantly kept ready for operation in such emergencies. This transfer, however, is determined by a time-cost schedule.

At the No. 15 mine of the company, fourteen loading machines, one of which is held as a spare, have produced 2.763.000 tons in 34 years. In 1931. miscellaneous delays amounted to only 0.50 per cent of working time. More than half of the delays were due to waiting for cars, with hoisting the worst offender against uninterrupted operation. "Our company." said Mr. lenkins, "considers the storage-batter, locomotive ideal from the service and

cost standpoint in gathering behind mobile loaders. In relay service, there is not much choice between battery and trolley types; we use the battery unit in this service for the sake of standardization."

Compensation costs at No. 15 mine last year were 2.5c. per ton. This figure, which included every item properly chargeable to that expense, was Ic. less than the figure for 1930. "And below the average for any state," re-marked Mr. Fear, who said that 1931 compensation costs for Consolidation Coal Co. averaged 2.1c. per ton and that the bogey set up-and already attained by several mines in the company-was 1c. J. J. Rutledge, chief, Maryland Bureau of Mines, Baltimore. Md., pointing out that compensation costs at some mines go to 8 and 10c. per ton, stressed the "handsome profit" which lay in the difference between such figures and 2.1c. About six months ago, added Mr. Fear, his company put mine safety entirely on a cost basis.

Premium payments for mechanical loading at the mines of the Union Pacific Coal Co., stated Mr. Bayless, have won acceptance as being of real advantage to both workers and management, and earlier misgivings as to the effect of paying a bonus for tonnage above the set task figure have disappeared. The system has increased earnings and tonnage and has attracted a better class of labor to the mines. Safety, however, has not been sacrificed to speed. Moreover, the system has given the management a gage for the capability and willingness of individuals to work and has shown how and where the individual will work best. It also has broken down resistance to the establishment of record shift tonnage.

As efficiency increased and the management saw its way clear, continued Mr. Bayless, premium rates have been revised upward. On shaking conveyor units, for example, where the output per man per day was 15.9 tons last year, the premium rate per ton for all loading in excess of that figure was 25c., as against an earlier premium of 124c. This premium applies to the entire crew. Under this system each man earned a premium of 82.2c. per shift. There were 65 shaking conveyor units in operation last year; 56.6 per cent earned premiums and produced 67.3 per cent of the conveyor-loaded tonnage.

At the Hanna mine, where mobile loaders predominate, premiums have been increased from 5 to 14c. per ton for crew loadings in excess of 250 tons per crew shift on first mining and in excess of 300 tons in taking top coal. During 1931, with seven Joys operating, 42.4 per cent of the Hanna machine men earned premiums and loaded 46.1 per cent of the tonnage, or 65.4 tons per

man-shift. The premium earned was \$1.025 per man-shift.

In pit-car loading, the premium is 28c. per ton for tonnage in excess of 13.5 tons minimum per man-shift. Last year, 33.3 per cent of the pit-car loaders produced 14.3 tons per man-shift and each man received a premium of 22.3c. per shift.

Establishment of premium rates for scraper loading presented difficulties because of differences in operating conditions as between sections and mines. The following rate finally was worked out: For all coal in excess of 20 tons per man-shift for all the regular crew a premium of 20c. per ton is paid. Where conditions demand it, extra men will be assigned to help the regular crew, but these extras do not share in the premium; nor does the necessity for this extra labor affect the established premium payment to the regular crew. During the last half of 1931, with five scrapers working, 21.7 per cent of the men on these machines earned a premium and loaded 24.5 per cent of the total scraper output, with a man-shift average of 23.6 tons against an average for all men of 16.7 tons. The premium workers received 72.7c. per man-shift.

Leaders of the loading crews, Mr. Bayless told Mr. Fear, receive no greater premium payment than other members of the crew. The Consolida-tion Coal Co., said Mr. Fear, pays its crew leaders more. The older workers, Mr. Bayless explained in reply to a query from C. F. Richardson, president, West Kentucky Coal Co., Sturgis, Ky., are assigned to easier jobs. Flagrant violation of rules governing the cleaning of coal at the face brings suspension to the entire crew.

The use of track-mounted machines in development work was described in a paper by John H. Richards, chief mining engineer, Hanna Coal Co., St. Clairsville, Ohio, read by W. L. Henry, U. S. Coal & Coke Co., Lynch, Ky. The methods under which entry-driving costs were cut 61 per cent were told in an earlier issue of Coal Age (Vol. 37. p. 95). John R. Foster, superintendent, Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill., expressed his approval of the Hanna system of classifying machines according to the kind of work and expected capacity. This plan, he pointed out, enables authorization of the number of men allowed on any one crew and, therefore, avoids overmanning.

### Safety—and the Balance Sheet

 $S_{drawal}$  of timbers have been in- other posts near by usually would be creased greatly by the use of power lost. for post removal, said D. A. Reed, manager, Elkhorn division, Consolidation Coal Co., Jenkins, Ky., at the opening of the Tuesday afternoon session of the Ninth Annual Con-vention of Practical Coal Operating Men, presided over by Thomas Moses. president, H. C. Frick Coke Co., Pittsburgh, Pa. Until the present system was adopted, continued Mr. Reed, all posts recovered were removed one by one with the aid of hand-operated post pullers. When a post was pulled, the



Six-ton gathering locomotives are now used to pull the posts. To avoid injury to the post-pulling crew from the flying ends of broken ropes, a weak spot is inserted in the rope at such a place that, should the rope break, the flying end cannot endanger the men. Since the adoption of this system, he stated, 5,734 props out of 6,083 sent into the mine have been recovered. This has meant not only a desirable salvage of material but also has removed props which otherwise might tend to delay the prompt failure of the roof behind the pillar line.

During the ten years ended in 1930, compensation costs, including hospitalization and medical services, at the mines of the Clinchfield Coal Corporation averaged 2.67c. per ton, according to Lee Long, vice-president of the company, Dante, Va. In 1931, the cost was down to 1.53c., and the management hopes to reduce this still further. Special efforts are being made to prevent accidents from falls because such accidents now account for 52 per cent of the fatalities. Transportation causes 23 per cent; handling of materials and supplies, 10 per cent; machines, 6 per cent: drills, 6 per cent.

The company has: (1) A mine safety

inspections of all operations; (2) a general safety committee, consisting of the superintendent, general mine foreman and all foremen; (3) a safety committee of seven in each mine. All fatal and serious non-fatal accidents are carefully investigated. At a general monthly meeting which all employees are required to attend, witnesses to accidents of the prior month are requested to describe the accidents seen or suffered. Foremen are rated on their accident records.

No electric detonator misfires have occurred at the No. 1 mine of the New England Fuel & Transportation Co. this year, said H. L. Griffin, mechanical engineer of the company, Grant Town, W. Va., but sometimes when the detonator has exploded there has been an incomplete explosion of the explosive itself. In five years, he continued, there have been no accidents chargeable to permissible explosives. Careful check is kept on all detonators, which are issued only to shotfirers, who must return all not used on the completion of their rounds. Shotfirers are instructed not to fire shots unless holes have been properly placed and drilled and sprinkling conditions in the mine are as ordered.

The advantages of Cardox in safe blasting were described by J. E. Jones, safety engineer, Old Ben Coal Corporation, West Frankfort, Ill.

Safety was again the major theme at the Thursday afternoon session, pre-sided over by E. W. Judy, vice-presi-dent, Duquesne Light Co., Pittsburgh, Pa. At this meeting, describing the automatic block signal service installed at the Fordson No. 8 mine (Coal Age, Vol. 36, p. 571), L. C. Skeen, general manager, Fordson Coal Co., Stone, Ky., made the point that not infrequently improvements made primarily from safety considerations give a direct money return in increased output and efficiency and in lower maintenance costs. In the case of failure of the collecting wire or relay, said Foster L. Apple, electrical engineer of the company, in reply to a question by B. F. Grimm, electrical engineer, Leopers Coal Co., Pittsburgh, Pa., every light on the line shows red until the trouble has been cleared.

In the Rocky Mountain region, de-clared William Morehead, general superintendent, Utah Fuel Co., Price, Utah, the trend is toward the exclusive use of permissible explosives, buried armored cable with junction boxes, and inclosed transformers. The experience of the Valier Coal Co. with protective clothing was outlined by D. W. Jones, superintendent, Valier, Ill. Results accomplished in this particular safety movement were set forth in the preceding issue of Coal Age (Vol. 37, p. 197). During the first quarter of 1931, said Mr. Jones, there were only 147

41,840 man-shifts, with a loss of 313 man-days, 104 of which were suffered by two men. Sixty per cent of the time lost was due to injuries to hands and legs.

Posting notices that wearing of protective hats, hard-toed shoes, and goggles will be compulsory after a certain date is an easy matter, remarked A. J. Ruffini, efficiency engineer, Wheeling Township Coal Mining Co., Adena, Ohio; the real task is enforcement. By patience and persuasion, his company



sold the idea of safety shoes to all underground workers to such an extent that many of the men have an extra pair to wear while worn shoes are being repaired. The last holdout, who alleged he needed arch support, suc-cumbed when informed he would be given shoes so equipped and admitted that the arch support story had been a fairy tale. Goggles are worn on all jobs where eye protection is needed. All tipple men wear them.

C. W. Gibbs, general manager, Harwick Coal & Coke Co., Pittsburgh, Pa., taking issue with the idea that protective hats could not be worn satisfactorily in low coal, stated such caps are used in 54-in. coal at a mine operated by his company in Greene County, Pennsylvania. At Harwick his company started a campaign for safety clothing about two years ago. The advisory force set the example, which was soon followed by the rank and file. Orders then were issued that each man should report for work fully equipped. As a result, the safety record

inspection force which makes periodic injuries of all classes reported in has been steadily improving. About 60 per cent of the improvement is attributed to protective shoes, hats, and goggles.

Another safety provision at Harwick is the underground refuge chamber to be used in case of explosion or fire. Three of these chambers are ready for service. Each chamber is 75x12x10 ft. Closure is through an air lock and the chamber is connected to the surface through two 8-in. boreholes, one of which is connected to an air pump driven by a 15-hp. motor. This pump can be started from the chamber through a pushbutton control. A lighting circuit and telephone wires also are carried in one of the boreholes. All wires are inclosed in lead armor.

The accident record at Harwick for the past three years, as given by Mr. Gibbs, is summarized as follows:

	Number	of Ac	cidents
Cause	1929	1930	1931
Roof falls	62 14	20 12	8 10
Handling rock and coal	35	22	1
Head, neck, and chest Eye	54 29 51	32 7 9	12 7 11

The frequency rate per 100,000 tons of production was 24.9 in 1928, 13.1 in 1929, 5.6 in 1930, and 3.2 in 1931.

Organization work must embrace even the lowliest worker, declared J. S. McKeever, general superintendent, Kanawha & Hocking Coal & Coke Co., Longacre, W. Va., Men must be given responsibility; but, when they err, the boss should take the blame. J. D. Rogers, vice-president, Stonega Coke & Coal Co., Big Stone Gap, Va., said that his company approaches morale through the channels of safety. Money compensation paid to the men by Stonega was 3.1c. per ton in 1927, 2.07c. in 1928. 1.76c. in 1929, 1.86c. in 1930, and 1.17c. in 1931. One mine last year produced 555,026 tons with a total compensation cost of only \$1,105. Another mine employing 250 men completed one year's operation on Jan. 21, 1932, without a compensable accident.

### Maintenance Problems to the Fore

MAINTENANCE and supply prob-lems had their innings at the Wednesday morning session of the Ninth Annual Convention of Practical Coal Operating Men, presided over by F. S. Pfahler, president, Superior Coal Co., Gillespie, Ill. Electrical maintenance questions were discussed by B. H. Mc-Crackin, maintenance engineer, Consolidation Coal Co., Fairmont, W. Va.; H. A. Treadwell, general superintendent, Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill., took up the

care and recovery of supplies underground; Frank E. Gleason, general master mechanic, United States Fuel Co., Hiawatha, Utah, had a paper on mine power distribution problems; and C. H. Matthews, electrical engineer, Susquehanna Collieries Co., Nanticoke. Pa., treated automatic underground pump control.

Many men are qualified to repair equipment, said Mr. McCrackin, but it takes real skill, intelligence, and foresight to keep equipment in such con-

dition that repairs are unnecessary. Such maintenance is the goal of his company. For example, formerly, on a road with a 3-per cent gradient, an armature would last about six months and wheels required frequent turning down; by using tandem locomotives of adequate power, the number of crews was reduced, speed increased from 5 to 10 miles per hour, armatures ceased burning out, and no wheels had to be turned down. The only costs were for oil, sand, and trolley-wheel replacements.

Many other savings are possible through proper coordination of equipment, auxiliaries, and men. Discharge lines, he pointed out by way of illustration, often are too small for the capacity of the pumps; men frequently reverse motors to stop locomotives instead of reserving the use of such means of slowing down to the emergency when a sudden stop is imperative. Records are valuable because, in showing where repeated failures occur, they suggest necessary changes in equipment design.

Lubrication of loading machines can cost a pretty penny if not supervised, but proper control can cut these costs as much as 75 per cent in some cases, said Mr. Treadwell. A record should be kept of the quantity of lubricant each machine is using; then if the quantity is abnormal, the machine should be inspected carefully to find the reason for the excessive consumption. At one mine, oil and grease are metered out to each machine from a supply truck. Records of lubricants furnished are in duplicate, one to the machine crew and the other for entry on a record card which gives a comparative performance picture of each machine.

The wiring crew has a truck on which all waste copper material is thrown. Where a truck is not used, he added, there is a real loss in material left in the gob or on the road and never reclaimed. A stock of timber, nightly replenished, is kept in the mine. Although no separate record is made of timber withdrawn from underground storage, all timber delivered to underground storage is charged and control is thereby effected. His company, continued Mr. Treadwell, also employs a motor to take supplies into the mines when and as needed. Proper care in making cable splices means not only increased safety and better power but decreased cable failures and lower cable costs.

Sheet-steel transformer stations are kept by the United States Fuel Co. at points where current is converted for pumps and like units, stated the paper by Mr. Gleason, read by Otto Herres, assistant general manager of the company, Salt Lake City, Utah. The floors of these stations are covered with 8 in. of sand to take up oil leakage in case of transformer trouble. The doors of the stations are kept open by a rope which

will burn and close the door should blazing oil spill from the transformers. Shooting circuits usually are suspended from the roof in back headings, but are hung on the side opposite the power lines when it is necessary to suspend them in main headings. Large savings have been effected by regenerative braking on a long plane having a descent of 800 ft. Electrical equipment is tested periodically.

Saving in man-power is not the only advantage of automatic pumping, said Mr. Matthews, whose paper was read



by W. C. Argust, division superintendent, Peabody Coal Co., Taylorville, Ill. The automaton does not continue to run a pump after the pump begins to function improperly, but shuts it down, locks it out of service, and sounds an alarm.

The manifold difficulties presented by operating mines beneath the sands and gravels of the Wabash River were described by James Hyslop, mechanical engineer, Walter Bledsoe & Co., Terre Haute, Ind., in discussing Mr. Matthews' paper. The roof of the Dresser mine frequently breaks unexpectedly into these water-laden sands and from 150 to 1,000 g.p.m. may drop suddenly into the mine. This water must be removed at once or the floor will heave. There is no time to lay a steel pipe line, so 1,000 ft. of 21-in. fire hose is kept on hand. Portable pumps of 150 to 1,000 g.p.m. capacity and 250-ft. lift, the first requiring 25 hp. and the second 100 hp., also must be provided.

Pump stations are maintained on arcwelded steel cars which carry a 100-hp. pump and the necessary electrical equipment. In anticipation of failures, the pumps have pressure gages and relays. The latest design station has two pumps each of which can lift 150 g.p.m. against a 125-ft. head. By using the pumps in series, they can lift 150 g.p.m. against a 250-ft. head: in parallel, 300 g.p.m. against a 125-ft. head.

Old territory is sealed off. When seals are of light material, water is pumped from behind them. When 4-ft. thick reinforced concrete or brick bulkheads are used, they are set in rib and floor and carried down to solid rock 3 ft. below the coal. To compensate for shrinkage, cement-gun grout is run through pipes at the top of the stopping until a tight joint is made. Sometimes about 25 g.p.m. will seep through the seals and must be pumped back of them.

### Modern Preparation for Profits

IN PRESENT highly competitive mar- 10 points above and below each desig-kets, coal is cleaned not so much to nated specific gravity. This curve limits obtain a premium as to enable the producer to sell large quantities with decreased sales resistance, declared B. M. Bird, chief concentration engineer, Battelle Memorial Institute, Columbus, Ohio, in opening a symposium on the economies to be effected by coal cleaning at the morning session of the Ninth Annual Convention of Practical Coal Operating Men on May 5, presided over by L. E. Young, vice-president, Pitts-burgh Coal Co., Pittsburgh, Pa. Cleaning underground, Mr. Bird insisted, is both expensive and inefficient when compared with topworks preparation; in fact it was doubtful, in his opinion, whether it paid to discard underground any but coarse pieces of slate over 3 in. in diameter, and even that crude face preparation would be uneconomical with machine loading.

Every coal is suited to some form of cleaning, he continued. A reliable method of determining which method is best for a particular coal is by making specific-gravity distribution curves showing the percentage of coal lying within

the operator to a certain group of processes. First cost of the process is not as important as the uninitiate might think, since the cost of the cleaning equipment proper is only about one-third that of the entire topworks and equipment. Plans should be flexible enough to provide for future modifications to take advantage of new processes or changes in market demand. Ample capacity is very desirable, since all washing equipment, except tables, is more effective when operated at slow speed.

Although irregular operation due to the depression has prevented the full enjoyment of the advantages of the installation, at the Rheolaveur plant of the American Rolling Mill Co., at Nellis. W. Va. (see Coal Age, Vol. 36, p. 299), gross savings since the plant was put in operation, said C. W. Connor, general superintendent of mines, have averaged 40c. a ton. The average cost of cleaning has been 10.9c. per ton, leaving a net gain of 29.1c. On this basis of profit, despite broken running time, the

investment will be retired in approximately four years.

The cleaning costs given, explained Mr. Connor, applied only to the coal actually washed-approximately 73 per cent of the output. If washing costs were spread over the entire tonnage, the average would be 7.94c. per ton. The cost figures, he added, include operating and repair labor, supplies, maintenance material, power, depreciation, taxes, interest on the investment. and all overhead. In addition, because of decreased ash content, there was a saving of \$17,423.53 in freight charges on 142.871 tons of boiler coal shipped during the eighteen months ended Dec. 31, 1931. The coal cost saved the receiving plant through the removal of impurities was \$15.831.37. These two items (transportation on incombustibles and removal thereof) meant 23.3c. saving per ton of coal used.

Comparing 24 cars of washed coal with 18 cars of raw coal at the Wuensch differential density washer at Midland, Kan., K. A. Spencer, vice-president, Fittsburg & Midway Coal Mining Co., Pittsburg, Kan., stated that the moisture content was increased only 0.3 per cent by washing, based on tests eight hours after washing, ash was decreased from 16.2 to 6.8 per cent, and the thermal capacity increased from 11.220 to 12.640 B.t.u. The reject contained from 68 to 89.2 per cent of non-combustible. The capacity of the original 30 to 35 ton per hour pilot plant (see Coal Age, Vol. 37. p. 51) has been stepped up and the running time increased until 600 to 800 tons per day is being treated. A 300ton per hour unit is being erected at the No. 15 mine.

With the Wuensch system, coal is washed in a heavy-density medium derived from the slimes of the plant, which consist of fireclay, shale and pyrite. The mixture, which approaches a colloidal solution, is fed to a cone. The top of the cone is filled with a medium of relatively low specific gravity, the bottom with one of high specific gravity. Because of the lightness of the upper part of the medium, small particles of impu-

rity which otherwise might be carried over with the coal drop readily toward the foot of the cone: conversely, because of the great density of the fluid at the bottom of the cone, no coal tends to pass off with the refuse.

Raw 11-in. slack is fed to a cone from which the clean coal floats away to a dewatering screen on the first section of which the medium, or sustaining, fluid is removed. This fluid, after passing to a Sirg tank, is pumped back to the top of the cone. On the second section of the dewatering screen, the coal is sprayed to remove fine particles. This weak fluid is passed to a 20-ft. thickener, where it is brought up to the required specific gravity. A diaphragm pump lifts this heavy fluid to the bottom of the cone. A small classifier removes any granular material which may be present in the wash water before it is sent to the thickener. There is a second classifier under the refuse dewatering screen to remove granular material from the wash medium prior to the delivery of this liquid to the thickener.

Without cleaning equipment, the Bradshaw Coal Co. could not have continued to exist, asserted L. A. Osburn. chief engineer, Bradshaw, W. Va. Following complaints in 1927 on 21-in. to zero nut-and-slack, a Menzies Hydroseparator was installed to wash coal between 1 and 21 in. The ash content in this size dropped from over 20 to 54 per cent. Because the minus 1-in. coal carried 15 per cent ash, however, it was necessary to carry the cleaning process still further, since this coal represented 45 per cent of the entire tonnage shipped. Float-and-sink tests at 1.50 sp.gr. showed that a product with less than 54 per cent ash could be recovered with little combustible in the reject, and an American pneumatic plant was installed to do this job.

Operating costs on the air-cleaned coal, including power, labor, supplies, depreciation at 10 per cent, interest on the investment at 6 per cent, and taxes and insurance, average 5.04c, per ton, Increased realization on the cleaned slack more than paid the entire cost of

the pneumatic cleaner (\$18,500) in the first four months of operation, and the plant, said Mr. Osburn, has not lost a day for lack of orders.

That clean coal increases running time and improves sales realizations also was borne out by the experience of the Pittsburgh Terminal Coal Corporation, as related by Joseph Pursglove. Jr., engineer, Pittsburgh. Pa. Prior to the erection of the Chance cleaner at the No. 8 mine (see Coal Age, Vol. 36, p. 286), coal at the No. 3 mine was lower in ash and sulphur than the product at No. 8. Although optional orders went to No. 8, that mine worked irregularly. Following the erection of the cleaning plant, optional orders were switched to the No. 3 mine; nevertheless, the No. 8 mine now works more steadily and its output commands a higher price than coal from the No. 3 mine. Both mines are in the same seam,

Western operators, said a paper by W. J. Schenler, chief draftsman, Colorado Fuel & Iron Co., and Benedict Shubart, Lindrooth & Shubart, Denver, Colo., read by T. T. Brewster, consulting engineer, St. Louis, Mo., must have tipples constructed to meet their peculiar needs. Much of the coal must be shipped 1,000 miles and a not inconsiderable quantity must be loaded in box cars to minimize pilferage. Slack has a limited market because of high transportation costs.

Recovery, said Mr. Young, had been as complete at the Pittsburgh Coal Co. mines with mechanical loading as with hand loading. Because of the inevitable degradation where storage requirements were imposed upon a plant with an hourly capacity of 200 to 400 tons, Mr. Pursglove objected to Mr. Bird's statement that a washery should have a storage bin capable of supplying coal for a 2-hour run. Mr. Bird answered that his statement referred only to coal that was to be cleaned mechanically, particularly 4-in. or 24-in. to zero. Where the larger lumps had been removed and the proportion of fine sizes was heavy. the middle range of sizes, he contended.



# NEW CRANE CREEK

+ Reflects Experience Gained In Operating Pioneer Air Plant

#### By J. H. EDWARDS Consulting Editor, Coal Age

ALL records for a month's loading from any one tipple in the smokeless fields of West Virginia were broken in October, 1931, when the Crane Creek plant of The American Coal Co. of Allegany County, situated at McComas, Mercer County, loaded 107,495 tons. This, however, is but one of several interesting features of an operation comprising a new and improved pneumatic cleaning plant completed in March, 1931, to replace one destroyed by fire in September, 1930. The rated capacity of the new cleaning plant is 200 tons per hour.

McComas was the site of the first washer to be installed in the smokeless fields, built in 1903 and consisting of two Christ jigs. In 1923, the first commercial air plant in the Eastern coal fields was installed at the Crane Creek mine. Seven years of intensive operating experience with this plant, and the

benefit of observation and tests as certain changes were made in equipment and methods, placed the officials in a position to know exactly what they wanted in the new plant. Excellent results in quality and uniformity of coal preparation are being obtained. By improved mechanical and electrical design, power consumption has been cut in half and maintenance greatly reduced.

The coal is from the Pocahontas No. 3 seam, averaging locally about  $4\frac{1}{2}$  ft. in thickness. Adhering to the coal at the top is a 1-in. stratum of "cube coal" averaging 35 per cent ash, and immediately above that is a "muck" several inches thick, otherwise described as a rotten slate or fireclay which crumbles. Other impurities consist of the characteristic bone and "sulphur band" partings totaling 2 in. or more and located near the center of the bed. Top cutting

Four Primary Separators With Hoods Opened



June, 1932-COAL AGE



Pipe Frame With Open Power Bus at Top Supports Starters and Safety Switches

machines are used in one section of the mine and bottom cutting in the other. Loading is done by hand and as much of the impurities as possible is eliminated at the working face.

Separators furnished by the American Coal Cleaning Corporation were used in the original plant, and equipment of the same manufacture but of the latest improved type was installed in the new plant. Wood construction was used for the first plant and the same construction was selected for the framing of the new, long-leaf yellow pine being used. The roof and siding are plain black corrugated iron, the same as was used on the old plant. Design and construction was handled by the coal company.

The original Roberts & Schaefer steel tipple with Marcus screen was not destroyed by the fire, so it is used with the new plant. One section of the mine is 44-in. track gage and the other is 48-in. gage. Mine cars of the two gages are handled in a cross-over dump arranged so that the change of gage can be made in less than two minutes. Car dumping, and operation of the entire preparation plant is carried on regularly for 16 hours per day. There are four loading tracks at the plant proper, and two more at an auxiliary loading point near by and served by a conveyor.

Lump and egg sizes are hand-picked. The reject, consisting of unattached bone and slate and amounting to 6 per cent, goes directly to the refuse, and the lumps of coal containing bone go through single-roll crushers. This crushed material joins the crude feed from the dump. The stove size is washed in a Menzies hydroseparator installed in the tipple structure. Refuse rejection consisting of bone and slate





The Original Plant With Early-Type Dust Collectors

New Plant in Operation; Bag Filters Efficiently Arrest Dust

tains 55 per cent ash.

Chestmut-and-slack, which is 55 per cent of the total output, is carried from the tipple to Parrish screens in the new plant by a 36-in. belt conveyor 172 ft. long set on an inclination of 23 deg. 40 min, and driven by a 25-hp. "Type CS Class 2" induction motor. The plus is goes directly to another hydroseparator. The crude feed to this separator runs 10 per cent ash and the cleaned product 6 per cent. A refuse rejection of 9 per cent and consisting of bone, slate, and cube coal runs 51 per cent ash.

The §x0 shek, 150 tons per hour, to be air-cleaned, contains approximately 50 per cent of material which goes through a g-in. "ton cap" screen. The impurities, which are very friable, are found in about the same proportious in the intermediate sizes from § to 0. Since it is necessary to clean efficiently down to 20-mesh, the \$x0 is cleaned on primary separators, the product then screened, and the through & re-treated on secondary separators.

Four pneumatic separators handle the primary treatment and three normally Another sepahandle the re-treatment. rator serves as a spare unit. The crude \$x0 shows by analysis S per cent ash and the finished product of the same size 54 per cent ash. From this grade there is a 7 per cent rejection which rune 40 per cent ash.

From experience in the old plant it was known that the efficient screening cut of the sul for re-treatment would require special attention. Etune area screeus are used and these are located in tour dust-bight boxes situated directly below the respective primary separators. Each hox contains two Hum-mer units in tanciem. The upper end unit, currying three vibrators, is on a slightly seeper pitch than the lower unit, which has but two vibraors. The same deck g-ton cap wire screen, is used on both sections. This is an elongated recimigu-

from this grade is 9 per cent and con- lar mesh, the through product from which, as operating at McComas, tests "65 per cent through" on a standard 10mesh screen.

In contrast to the old plant, which used numerous scraper conveyors and but one belt conveyor (and that a short one), transfer of materials in the new plant is accomplished almost exclusively by belt conveyors equipped with rollerbearing idlers and pulleys. Motors of the new plant are all of the ball-bearing type.

saving in power, attributed The principally to the more simple and efficient transfer of the material, is impressive. The new plant consumes approximately 80,000 kw.-hr. per month, as compared to consumptions of 150,000 to 170,000 with the old plant. There is a saving in maximum demand as well (Turn to page 242)

#### Flowsheet of Tipple and New Preparation Plant



# ACCIDENT REDUCTION

# + All Along the Line Cheers Mine Inspectors

Success in reducing fatalities and lost-time accidents, the sense that at last progress was being made in the baleful record of earlier years, gave the twenty-third annual meeting of the Mine Inspectors' Institute of America, held in Wilkes-Barre, Pa., May 9-11, a more cheerful complexion than any that have preceded it. It ran as a fine thread of comment through the meeting and was definitely developed by Daniel Harrington, U. S. Bureau of Mines, at the close.

Systematic timbering and the establishment of long-pillar lines have reduced accidents at the mines of the Pittston Co., said Andrew Wilson, safety inspector of that company, Pittston, Pa.

As a disciplinary and educational measure, every miner is required to stop work the moment an official enters his chamber and to test the roof across the entire working face. Pillars were formerly drawn at scattered points through the various seams, this unsystematic pillaring causing squeezes almost daily in some part of the mine. No. 9, or Avoca, colliery in 1931 produced 500,000 tons of coal with but one accident, and that involving only 27 man-days of idleness. J. J. Walsh, Deputy Secretary of Mines, anthracite division, Wilkes-Barre, Pa., said that the quality of this record was attested by the fact that the department had set 35,000 tons per lost-time accident as bogey for the anthracite region, and tew mines indeed had made any such record.

Mr. Wilson declared that though strict discipline was maintained, men were not sent home or discharged for violations. Gold stars were given foremen and assistant foremen for good records; the company found the miners were most anxious to see their foremen win these stars.

By an enactment of law, October, 1931, in the State of Ohio, systematic timbering has been made obligatory, said James Berry, chief of the State Division of Mines, Columbus, Ohio. It is too early to attest its value, but during the first three months of this year, five fatal accidents occurred in Ohio from roof falls, three of which were in the class of mines too small to come under the law and which produced only about 2 per cent of the entire coal tonnage of the state and two only



John G. Millhouse Inspectors' New President

in mines producing the other 98 per cent of the tonnage.

Quoting Thorndike's "Adult Education," H. B. Northrup, director, Mineral Industries Extension, Pennsylvania State College, State College, Pa., said that the peak of ability to learn is reached between the ages of 20 and 24, with 25 to 29 as the next best time. Adults 30 years of age or older can learn more easily than youngsters in junior or senior high school. Professors who, at night, teach adults the same courses that they teach to college boys and girls by day, find that their adult classes learn faster than younger students. During the last year of the fouryear night school classes of the Philadelphia & Reading Coal & Iron Co., said Frank Sluzalis, chief safety inspector of that company, Mt. Carmel, Pa., the utmost informality is encouraged. The men sit around a table and discuss mine problems without a single class book; no examinations are provided. Each man contributes his part. In the first year, little but dayschool studies are attempted. In the second and third years, the men are prepared in those features which are needed for passing state examinations, but the fourth year is for development of the power to think, and to adapt the lessons learned to the task of the day. Much improvement has been noted.

Details regarding the disastrous explosions at the Woodward shaft of the Glen Alden Coal Co. on May 27, 28 and 29, 1927, and the mine recovery between those dates and thereafter were described by P. H. Dever, assistant to general manager of that company, Scranton, Pa., who reviewed this subject in *Coal Age* (Vol. 37, p. 187). Similar occurrences in the mines adjacent were described by E. C. Curtis, state mine inspector, Kingston, Pa.

After the explosion at the Woodward shaft, both intake and return passages in Shaft No. 3 became intakes, said Mr. Curtis, the air being drawn to Shafts Nos. 1 and 2. The inspectors favored sealing the return first. However, it was decided that the intake should first be sealed. Mr. Curtis commended the admirable way in which the recovery was made, no less than 325 major seals and 23 airlocks being erected.

David T. Davis, mine inspector, Wilkes-Barre, said that the Wilkes-Barre Connecting Ry., sank 2 ft after the cave. The mine makes 7,000,000 cuft of gas every 24 hours. He thought it the most gassy mine in the United States, if not in the world. To dilute the gas, enough air was put day by day into the mine to give every man 1,000 cuft of air per minute.

Questioned as to the relative advantage of sealing of intake or return first, in case of a fire, J. T. Ryan, vicepresident, Mine Safety Appliances Co., object was to seal the fire as soon as possible whether on intake or return. Sometimes when there are many seals and one does not have a sufficient supply of oxygen-breathing apparatus on hand for sealing the return, the intake must be sealed first. With this conclusion, J. J. Forbes, U. S. Bureau of Mines, Pittsburgh, Pa., concurred. He recalled that at the mines of the Pittsburgh Terminal Coal Co. the officials tried to seal the return first, and 20 were killed.

At a mine in Alabama, a fire occurred in an area with only develop-Erskine ment headings, declared Ramsay, chairman of board, Alabama By-Products Coal Corporation, Birmingham, Ala. The company erected temporary seals and then commenced to build a permanent seal of stone and mortar. After it was completed a man tested it for tightness with an open lamp. The flame was sucked in, and a terrific explosion occurred, killing the man and utterly obliterating the stopping. A man in a crosscut along the roadway in which the stripping had been erected escaped unhurt. Three explosions occurred one after the other. Evidently, the explosion befouled the atmosphere and made another explosion impossible till the inert gases of the explosion were spent. The fire fighters arranged to build their brattices between explosion intervals, feeling assured that the time interval would not be shortened.

Seal the return first but wait till the mine is giving out inert gas enough to render methane inflammable: it is useless to attempt to seal before that time, said Mr. Walsh.

"The average experienced miner is better informed of the dangers he encounters in his working place every day of his life than anyone I know of." declared J. G. Millhouse, director, Department of Mines and Minerals, Springfield, Ill., advocating the personal appeal in safety promotion.

Among the practices in the mines of the Bell & Zoller Coal & Mining Co., said John Lyons, safety engineer of that company, Zeigler, Ill, have been the exclusive use of Cardox for shooting and the use of the Union Carbide Co. methane indicator for testing returns. Props must be placed not less than 30 in, from the rails in rooms; safety props must be set when using loading machines on faces and all tripriders are required to secure their trousers at the ankles.

Since Dec. 5, 1930, there has not been a single fatal accident in Zeigler No. 1, though 1,291,799 tons of coal has been produced. The former average for ten years was one fatality for 310.355 tons. No. 2 mine was operated from Aug. 6, 1928, to Sept. 28, 1931, without a fatality, at which

produced. Yet in the previous ten years at that mine the rate had been one fatality for 1,329,943 tons of coal produced.

In British mines, particularly in South Wales, said L. W. Brown, inspector oil and gas division, Charleston, W. Va., reading the paper of R. M. Lambie, chief, Department of Mines, ol the same city, 3 per cent of methane in a split and 2 per cent in the main return is not unusual, and yet oilburning safety lamps are used and explosions are less frequent than in the United States. In Great Britain, the gas fireman, examiner or deputy is not expected to be able to detect less than 2 per cent of gas with his lamp. Why, then, are our regulations as to gas percentage more stringent and our results less satisfactory? asked Mr. Lambie.

Answering his question, he declared that it was because we felt obliged to permit the use of electrical machinery in mines, and such machinery is not permitted in Great Britain in mines where gas is present. At any indication of open sparking in a normally non-gassy mine, power must be shut off, all rubbing contacts on electrical machinery must be inclosed to prevent open sparking, and electric haulage on the overhead trolley system is forbidden in all coal mines. With causes of ignition eliminated, fear of an explosion is greatly reduced.

A gassy mine Mr. Lambie would define as one in which 0.75 per cent of methane may be found by air analysis, or by a methane detector in

At the annual meeting of the Mine Inspectors' Institute of America, held May 9-11 in Wilkes-Barre, Pa., the following officers were elected:

- John G. Millhouse, director, Department, Mines and Minerals, Springfield, Ill., president.
- J. F. Daniel, chief, Department of Mines, Lexington, Ky., first vicepresident.
- P. J. Friel, mine inspector, Shamokin, Pa., second vice-president.
- Thomas Stockdale, mine inspector, Bramwell, W. Va., third vice-president.
- C. A. McDowell, safety and personnel manager, Pittsburgh Coal Co., Pittsburgh, Pa., secretary. J. J. Forbes, U. S. Bureau of Mines,
- Pittsburgh, Pa., assistant secretary.
- J. J. Rutledge, chief engineer, Maryland Bureau of Mines, Baltimore. Md., treasurer. J. T. Beard, Danbury, Conn., editor
- in chief.
- R. D. Hall, engineering editor, Coal Age, New York City, publicity editor.

Pittsburgh, Pa., said that the main latter date 3,756,525 tons had been any return, or where 0.5 per cent can be found at the working place with normal ventilation and normal air pressure or where 2 per cent can be found in any working place where ventilation has been cut off for a period not longer than an hour.

> One danger in American mines is the big tonnage produced per man per day -1.21 tons in British mines as against 6.7 tons per man for the West Virginia mines. In the mines of that state safety directors accompany mine inspectors in visits to the workings and take at least six air samples at each mine to complete the check on the gas content of the mine air. What is wanted, declared Mr. Lambie in his paper, is a gas detector attached to electrical appliances that will shut off the power on a machine when the percentage of methane exceeds a specified quantity. Maryland law, said J. J. Rutledge, chief engineer, Maryland Bureau of Mines, Baltimore, Md., gave the vaguest of definitions for a gassy mine. He defined such a mine as one having 0.5 per cent in the main return and 0.3 per cent in any split.

> An underground metal mine has produced 14,000,000 tons of copper ore without a fatality. An iron-ore company with six mines (three underground) has operated these mines for a vear without a lost-time accident. Thirty mines of one iron company having about 3,000 employees, have averaged nearly 10 months of operation without a lost-time accident. Thus did Mr. Harrington in the closing address set a bogey for coal-mining miners and operations to aim at.

> The tentative coal-mining fatality rate of 3.27 persons killed per million tons in 1931 set a record not equalled or surpassed in any year in the present century and probably not equalled in the history of coal mining in the United States. One of the reasons for the excellent safety record in coal mining in 1931 was the fact that explosions caused only 86 fatalities, as compared with 264 in 1930 and an average of 341 annually from 1922 to 1931 inclusive. In all the panic years except 1931, the fatality rate per million tons of production was higher than the average of the 5-year period in which each depression occurred, yet the panic year 1931 had an unusually low fatality rate.

Anthracite mines also are making progress. In the present year they have had in the first three months 58 fatalities, as against 108 in the same three months of 1931, a reduction of 46 per cent, but production dropped 22 per cent.

On Wednesday a visit was made 10 the Woodward colliery, the members being shown the edge of the cave in Eighth West. Later they explored the Dorrance colliery and the Red Ash fire.

# + Cut by Belt Conveyor

TESTS were made recently on the coal hoists at two mines of the Union Collieries Co. and on the belt conveyor at the Wildwcod mine of the Butler Consolidated Coal Co., to compare the efficiency—from the standpoint of power costs only—of these two methods of bringing ccal to the surface. No study was made of first costs, of the feasibility of installation of conveyors vs. hoists or of relative maintenance costs.

The slope conveyor at Wildword has a capacity of 750 tons per hour with an unusual drive consisting of a 250-hp. and a 75-hp. induction motor operating at unequal speeds. The vertical distance of the lift is 210 ft. The two mines of the Union Collieries Co. located at Renton and North Bessemer are equipped with drum-type hoists directconnected to 700-hp. induction motors. The vertical lift at Renton is 587 ft. and at North Bessemer 375 ft.

In making the tests, meters were installed to measure the electrical input in kilowatt-hours to the driving motors and the mechanical output in footpounds was obtained from the weight of the coal hoisted and the vertical distance of the lift. Dividing the footpounds output by the kilowatt-hour input the efficiency of the hoist at Renton was found to be 44.2 per cent and at North Bessemer 39.2 per cent, compared with an efficiency of 63.5 per cent for the conveyor belt at Wildwood.

To evaluate these results in terms of saving in power cost it was assumed that the two hoists could be replaced with belts which would operate with the same efficiency as the one at Wildwood. When the power bills for the test period were recomputed on this basis, the indicated savings amounted to \$427 a month at the Renton mine and \$214 a month at the North Bessemer mine. When the assumption was made that the belt at Wildwood would be replaced with a hoist to operate with the same efficiency as the one at the Renton mine, the increase in the monthly power bill at Wildwood would be \$142.

All of these mines are located in the Pittsburgh district and purchase power from the Duquesne Power Co. The power cost is based on the kilovoltampere demand and the kilowatt-hours of energy. The average fifteen-minute demand, the instantaneous kilowatt demand, the kilowatt-hours and the reactive kilovolt-ampere-hours are obtained each month by measurement. In accordance with the terms of the power rate, the kilovolt-ampere demand used in billing is determined by increasing By F. A. KOLB

Industrial Power Salesman Duquesne Light Co. Pittsburgh, Pa.

With electrification making such steady progress in coal mining, the power bill naturally is absorbing an increasing percentage of the operating-cost dollar. Power costs, therefore, have become a major management problem. In this article, Mr. Kolb approaches one phase of the problem in a study of comparative power costs for conveyors and hoists at three mines in western Pennsylvania. As the author frankly admits, there are other factors which also must enter into the determination of the choice of system for bringing coal to the surface. In the case of the shaft mines studied, the depths are beyond what the industry now considers the practical limit for easy pitch slopes such as would accommodate belt conveyors: Mr. Kolb meets this possible criticism of his study by not only giving figures on power costs were it feasible to have made the shaft mines slopes but also by setting up what power costs would be if the slope operation had used a hoist instead of a belt conveyor.

#### Summary of Results

Juliman	.,		
	Hoist Union Collieries Renton, Penna.	Hoist Union Collieries North Bessemer, Penna.	Belt Butler Consolidated Coal Co., Wildwood, Mine
Feriod covered, days Vertical distance that coal was hoisted in feet Tons of coal hoisted during test period Total kilowattheous	42 587 92,233	55 375 46,524	58 210 173,332
test period	92,400	33,600	43,200
heisting equipment only	440	240	162
only during the test period.	97,200	Not read	55,620
output divided by kilowatt hours input.	44.2%	39.2%	63.5%
kya hours divided by kilowatt-hours.	69%	Not read	61.4%
efficiency as obtained at Wildwood.	64,200	20,700	Same
a hoist, assuming the same efficiency as Benton Saving per month in power cost due to decrease in			62,100
instantaneous demand with a belt.	\$427.00	\$214.00	None
a hoist			\$142.00

the maximum average fifteen-minute kilowatt demand a certain percentage based on the instantaneous demand and the result divided by the power factor as calculated from the ratio of the reactive kilovolt-ampere-hours and the kilowatthours.

The tests which were made indicated that if the hoists were replaced with conveyor belts the various factors involved in the power cost would be affected as follows:

1. The kilowatt-hours would decrease, due to the higher efficiency of the belt.

2. The high instantaneous demands caused by the hoists would be eliminated.

3. The maximum average fifteenminute demand would be reduced, due to the increase in efficiency. The amount



of the decrease would depend on the diversity between the hoisting load and the remainder of the total load.

4. The over-all power factor, which is high, due to the synchronous motor generator sets installed to supply directcurrent requirements, would not be affected.

The assumed savings of \$427 and \$214 a month would be the result of decrease in kilowatt demand and kilowatt-hours, and the elimination of the high instantaneous demands. The increased cost at Wildwood for a hoist would be due to the increase in these items which determine power cost. The difference between the savings at the Union Collieries Co. mines is due to the difference in the amount of energy used in hoisting, the instantaneous demands created, and the difference in the efficiency of the hoists. The larger saving is shown for the mine using the greater amount of energy for hoisting. While these savings represent a considerable reduction in the cost of power for hoisting only, they are a relatively small percentage of the total power cost.

As stated in the opening paragraph. the power question alone was considered in this particular study. The first cost or feasibility of replacing either the hoists or the belts has not been analyzed, but it is recognized that the cover at the two mines of the Union Collieries Co. is of such a depth as to make a practical installation of a belt somewhat doubtful - particularly at Renton. Furthermore, the efficiency of hoisting depends on the time of the hoisting cycle and the amount of the load as well as the depth of the shaft, so it is possible that a hoist might be designed for Wildwood which would be more efficient than the one at Union.

With these limitations the values which have been obtained in this study will serve as an indication of the part which power cost should play in a comparison of these two methods of lifting coal to the surface. Experience at Wildwood indicates that the saving in maintenance of equipment and reduction in labor cost with the conveyor belt as compared with a hoist is greater than the saving in the cost of power.

### Crane Creek Reflects Experience Gained In Operating Pioneer Air Plant

#### (Concluded from page 238)

as in energy. The energy consumption of the new plant is averaging 1.57 kw.-hr. per ton of cleaned product handled by the new equipment. For the entire preparation plant, including tipple but excluding a hoist for disposing of refuse up a hillside incline, the power consumption is 1.05 kw.-hr. per ton of all sizes shipped.

Dust collection is efficiently handled by a cloth tube filter system of standard design. One blower of No. 13 size driven by a 75-hp, motor exhausts the dust from three \$x0 separators to a group of 560 tubes, and a No. 12 blower driven by a 60-hp, motor exhausts from four \$x0 separators and one \$x0 separator to another group of 464 tubes. All tubes are approximately 7 in, in diameter and 19 ft. 6 in. long. As compared to the old plant, which was equipped with cyclone collectors, there is practically no escape of dust to the outside.

Total connected load in the new plant, exclusive of the tipple, is 450 hp. Thirty-eight motors ranging in size from 3 hp. to 75 hp. are used. All are 440-volt, single squirrel-cage type, and 900 r.p.m., except that two 20-hp. 720r.p.m. motors of the double squirrel-cage type are used on the two large belt conveyors.

All except the two dust-fan exhaust motors are controlled by magnetic starters. The less expensive manual compensators are considered satisfactory for these two largest motors inasmuch as they are started but twice daily.

as a rule. Sequence control is not employed. Safety switches and starters are grouped on a pipe-frame rack along the top of which is supported the 440-volt bus of insulated cable. Power and lighting circuits are protected by rigid conduit.

General illumination in the new plant is from 150-watt lamps without reflectors. Picking tables in the tipple are illuminated by 300-watt Type C Mazda lamps in deep open-type porcelain enameled reflectors. Illuminated intensities on the various sections of the picking surfaces average about 6 footcandles.

The number of motor drive connections of each type and the applications in brief are as follows: 11 worm gear reducers on belt conveyors, 3 flat belts on elevators, 18 V-belts on fans and pneumatic separator drives, 3 direct connections on centrifugal pumps and the motor generator for Hum-mer screens, 2 spur gears on feeders, and 1 silent chain on Parrish screens.

The plant was designed and constructed under supervision of the coal



A Three-Vibrator Unit and a Two-Vibrator Unit in Tandem in Dust-Tight Box Directly Under Primary Table. In the Foreground Is the Belt Conveyor Feeding the New Plant

company engineering department, but the ideas of officials of the operating and sales departments were incorporated in the design. From their experiences with the original preparation plant the officials had rather definite ideas regarding improvements that should be made in the new plant, yet the final design was not approved until several of the most modern cleaning plants in the state had been inspected by representatives from the various departments. Those responsible for the successful operation feel that the excellent results being obtained have amply repaid them for time, energy, and careful consideration given to the design and construction.

# TWELVE MONTHS' GROWTH

## + In Mechanical Mining Aids Reflected in New Equipment Shown at Cincinnati

SIXTY-EIGHT manufacturers of mining equipment and supplies were represented at the Ninth Annual Convention of Practical Coal Operating Men and National Exposition of Mining Equipment, held at Cincinnati, Ohio, May 2-7, under the auspices of the Manufacturers' Division of the American Mining Congress. Higher capacity, longer life, more efficient operation, economy, and safety were stressed by the exhibitors, who displayed loading and cutting machines, transportation equipment, mechanical preparation processes, safety aids, pumps and pipe, ventilating and lubricating equipment, electrical equipment and supplies, power transmission equipment, wire rope, bearings, and other machinery and supplies for coal mining.

Joy Mfg. Co., Franklin, Pa., showed comotives, and other coal-mining equipits new 8-BU loader and also the Mavor & Coulson Samson low-vein shortwall cutter, 20-in. flat belt conveyor, and 24-in. troughed belt con-veyor. The 8-BU loader is designed to supplement the high-tonnage, heavyduty 5-BU loader for thick seams, and the 7-BU loader for 48- to 60-in. coal. The 8-BU, weighing 9,500 lb., although lighter and more compact, has a capacity only slightly smaller than the 5-BU and 7-BU machines. Over-all dimensions are: height, 35 in.; width,  $4\frac{1}{2}$  ft.; length, 20 ft. 5 in. The conveyor which carries the coal from the gathering head to the mine car can be swung 45 deg. to either side of the track, and, it is declared, has sufficient vertical range to meet reasonable variations in the height of mine cars and other equipment. A caterpillar mounting is provided, with two speeds forward and reverse. All power connections are made in accordance with U. S. Bureau of Mines specifications for permissible equipment.

Clarkson Mfg. Co., Nashville, Ill., exhibited the Clarkson loader described in Coal Age last year (Vol. 36, p. 216). A Whaley No. 3 size "Automat" loader was shown by the Myers-Whaley Co., Knoxville, Tenn. Jeffrey Mfg. Co., Columbus, Ohio, offered a pictorial display of its loaders, cutters, drills, lo-

ment. Sullivan Machinery Co., Chicago, had a working model of an English scraper-loading installation using the Sullivan portable hoist. Lorain Steel Co., Johnstown, Pa., showed face and main conveyors.

The new Type 5-B coal saw for "powderless mining" was presented by Joy Bros., Inc., Marion, Ohio. With this machine, equipped with a single instead of a double blade, narrow slots

13 in. thick and 5 ft. deep can be made. By turning the blade from horizontal to vertical position and raising or lowering the machine hydraulically, the coal face can be sawed into blocks of any desired size, the company points out. Dirt seams may be sawed out separately. The blocks are dislodged by a hydraulic breaker pad for loading, thus eliminating powder and, it is asserted, increasing the yield of coarse coal. The 5-B coal saw is 24 in. high and can be used in coal down to 30 in. A selfpropelled truck is employed for tram-ming the machine from place to place. Permissible electrical equipment can be furnished.

Cutting machines and parts formed part of the displays of several manufacturers. In addition to pictorial displays of low-vein and high-type cutters, the Goodman Mfg. Co., Chicago, featured a new ball-bearing cutterhead with all parts, except the bearings, interchangeable with the standard cutterhead. Smooth performance, reduced power consumption, lower maintenance, and longer chain life were stressed by the manufacturer. In addition, Goodman displayed cutting-machine parts, and augers and bits.

Sullivan Machinery Co., Chicago, featured its new nickel-molybdenum cutter chain. "Supersteel" cutter bits,

Joy 8-BU Loader





Joy Bros. Coal Saw and Breaker Pad

pneumatic coal pick and tool, and the L-1 30-lb. light "Rotator" rock drill. Features of the new cutter chain stressed by the company are: nickel-molybdenum alloy strap links and cutter links made from drop forgings; new-shape strap link, providing 25 per cent more area to resist tensile and shearing stress; rivet size increased from 1/2 to 5/2 in. without reduction of joint strength and with equal countersink depth, so that rivets may be punched out for replacement with equal ease; more metal in cutter links to give increased strength, especially around bit recess and setscrew hole, as well as at strap link joints; reduced friction and wear between cutter chain and bar, increasing chain and jib life, and cutting chain friction losses.

Sprockets, cutter chains, cutter heads, bits, and bit wrenches were shown by the Cincinnati Mine Machinery Co., Cincinnati, Ohio.

Various types of drills and drilling supplies were exhibited by the Chicago Pneumatic Tool Co., New York; and the Ohio Brass Co. Included in the Chicago Pneumatic exhibit were: No. 572 permissible coal drill; No. 574 mounted permissible drill (*Coal Age* March, 1932, p. 129); No. 327 one-man air drill; and other pneumatic tools. The new No. 327 coal drill takes a standard auger, and will drill holes up to 9 ft. in depth. Weight is  $27\frac{1}{2}$  lb.

The Ohio Brass Co. displayed its portable, one-man, permissible coal drill (Coal Age, December, 1931, p. 654).

tactors or pushbutton. When the empty car goes through the dump or off the cage it strikes a track switch, which causes the motor to close the horns and stop the trip. A limit switch is provided to control operation of the horns and the stopping of the trip. The electrical control, according to the company, may be placed anywhere or operated from any point, and the equipment is said to have the further advantage of ability to handle several types and sizes of cars in the same trip without complicated mechanical equipment. With an electrical interlock, the cager can be used with feeders, the interlock allowing the horns to open first, after which the feeder starts.

New steel mine car hitchings, steel wheels, cast-steel shovel chain, and the Willison coupler were shown by the National Malleable & Steel Castings Co., Cleveland, Ohio. The new "Naco" steel mine car wheels, the company states, eliminate tread sprawling and flange breakage, due to the high yield point and ductility of the steel used.



### **Efficient Transportation Sought**

Haulage equipment and supplies again Sanford-Day also displayed a model of comprised an important part of the Cincinnati exposition. While there were no actual machines on the floor, locomotives were stressed pictorially by the Jeffrey Mfg. Co., Columbus, Ohio; Baldwin Locomotive Works, Philadelphia, Pa.; Mancha Storage Battery Locomotive Co., St. Louis, Mo.; General Electric Co., Schenectady, N. Y.; and the Goodman Manufacturing Company, Chicago.

The Goodman organization also displayed a new dust- and waterproof universal type locomotive headlight, designed to replace headlights on existing locomotives. According to the company, the headlight may be adapted to permissible or open-type equipment by changing the connections. Additional features include silver-plated, spring-mounted reflector; 94-watt lamps; and malleable iron case.

Sanford Day Iron Works Co., Inc., Knoxville, Tenn., stressed a new individual latch-tripping mechanism for use on its eight-wheel bottom-dumping cars. A separate trip is provided for each door and, according to the company, use of this mechanism allows the doors to be dropped in any desired sequence.

a new car for use with rotary dumps. The company emphasized the simplified construction, which includes a flat bottom made of the pieces of steel. The car is equipped with a new-type combined spring bumper and drawbar. The springs are in compression at all times, and thus cushion shocks whether starting or stopping. The company also called attention to its "1-2-3 Automatic" mine car, as well as other types of dropbottom cars, end-dump cars, rotary dumps, and wheels.

Steel cars were shown by the Lorain Steel Co., Johnstown, Pa., in connection with its conveyor exhibit. Mining Safety Device Co., Bowerston, Ohio, displayed models to show the operation of its line of dumps and cagers. General Steel Castings Corporation, Eddystone, Pa., showed one of its line of cast-steel, one-piece underframes for mine cars.

A new automatic electric car cager, for which the advantage of elimination of many mechanical parts is claimed, was displayed by the Roberts & Schaefer Co., Chicago. The horns of the cager are operated by an electric motor, which is started by car. dump. or cage con-

"Brownie" 10-Hp. Portable Electric Hoist

Also, "Naco" wheels are said to resist flattening. Different sizes and different bearing designs are available, and comparatively lighter weight is emphasized by the company. The new "Naco" steel hitchings and links, it is said. have an ultimate strength of 90,000 to 100,000 lb. Hitching links are stronger than the bolts, and do not distort when bolt strength is exceeded, thus enabling the hitching to be put back in service by replacing the bolt. Uniformity in size, smoother operation, greater durability, and increased strength are claimed for "Naco" cast-steel shovel chain, which is made in several sizes. Chain repair links are available.

Duncan Foundry & Machine Co., Alton, Ill., displayed mine car wheels to show the different types of bearings used, and also exhibited wheels bored with different chuckings to show effect on accuracy of construction and alignment.

A new portable electric hoist with a normal-rating drawbar pull of 2.000 lb. was displayed by the Brown-Fayro Co. Johnstown, Pa. Average rope speed, according to the company, is 200 ft. per minute, and the drum has a capacity of 1,500 ft. of  $\frac{3}{8}$ -in. rope. The hoist is equipped with a 10-hp. totally inclosed motor. A spiral bevel-gear right-angle drive is said to provide compactness and hold the equipment to a minimum overall width of 36 in. The "Brownie" variable friction-drive mechanism, said to give instant and complete control of the rope at all speeds and loads, is included. Ball bearings, ease of lubrication, and guards for all working parts are stressed by the company.

Brown-Fayro also showed a new free-wheeling automatic brake for use particularly with slow-speed car-haul hoists. The brake is totally inclosed and is arranged for mounting on an extension of the motor shaft; it is intended to take the place of the ordinary solenoid brake used to prevent lowering of the load. Improved balance, deepchilled wearing surface, and completely inclosed, grease-packed Timken bearings were features claimed for the new 6-in. track roller exhibited by Brown-Fayro. This roller is equipped with brackets to guide the rope into position. The Brown-Fayro Co. also exhibited a 24-in. throat diameter Timken-bearing equipped sheave with stand, one of a line of sizes from 15 to 42 in., and also showed car wheels, pulleys, and sheaves.



#### Goodman Magnetic Transfer Switch

West Virginia Rail Co., Huntington, W. Va., displayed rail sections and steel ties. Copper-steel mine ties, light rails, and wrought-steel mine-car and locomotive wheels were shown by the Carnegie Steel Co., Pittsburgh, Pa. Bethlehem Steel Co., Bethlehem, Pa., exhibited rails, steel ties, switch ties, car-stop and sprag, Dardelet thread-lock bolts, guard rail chairs, rail extension ties, and mine locomotive wheels. Cincinnati Frog & Switch Co., and the Weir-Kilby Corporation, Cincinnati, Ohio, showed frogs, switches, and throws.

Aerial tramways for the transportation of coal and refuse were featured by the American Steel & Wire Co., Chicago.

Electrical supplies entering into mine haulage and exhibited at the convention are treated on pages 245-6 of this issue.

### Electrical Aids to Save Power

Welding equipment, cable, bonds, and other electrical haulage auxiliaries; control equipment; and storage batteries were the principal items shown by electrical manufacturers at the Cincinnati exposition. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., stressed the new "De-ion" flashless breaker (Coal Age, May, 1932, p. 218); ex-

Westinghouse "Cold-Arc" Magnetic Controller for Mining Use



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plosion-tested linestarters; the "Gearmotor"; and the new "Cold-Arc" magnetic controller for mining equipment. This controller, according to the company, gives efficient operation with extreme variations in voltage and load conditions. Overload protection allows heavy loads to be started, or permits moderate overloads to be carried for a short time, but the contacts trip instantaneously on dangerous overloads or short circuits. In addition, according to the company, the contactor will open on short-circuits without arcing sufficiently to burn the bare hand when placed over the arc box.

General Electric Co., Schenectady, N. Y., displayed an arc-welder, welding electrodes, and examples of application of photo-electric and "Thyraton" tubes to control of equipment.

Electric Railway Improvement Co., Cleveland, Ohio, exhibited its lines of rail bonds designed for copper or steel arc-welding processes, and showed the new SBR-2 rheostat, said to be sturdy and to have stronger and more rigid resistance elements than usual. Longer life is claimed as a result of this construction.

Ohio Brass Co., Mansfield, Ohio, showed trolley supplies of all kinds.

automatic pump starters, circuit breakers, locomotive headlights, sectionalizing insulator switches, trolley harps and wheels, gasproof junction boxes, welding machines, and rail bonds.

Goodman Mfg. Co., Chicago, offered for inspection an automatic transfer switch for mine-locomotive use. This switch, according to the company is made with a dust- and waterproof case and is smaller and more compact, but with greater capacity. It will operate, it is stated, on one-half of normal or 10 per cent overvoltage. Contacts have a rolling and wiping action, which is said to promote cleanliness and prevent sticking.

Steel-grid resistances, automatic transfer switches for mine locomotives, and automatic starters were shown by the Post-Glover Electric Co., Cincinnati, Ohio. Sullivan Machinery Co., Chicago, displayed "Strongalite" mine lighting cable.

"Tiger-Weld" rail bonds, bare copper wire and strand, trolley wire, and insulated electric cables were exhibited by the American Steel & Wire Co., Chicago. Armature coils were offered by the John A. Roebling's Sons Co., Trenton, N. J. Edison Storage Battery Co., Orange, N. J., displayed various types of Edison nickel-iron-alkali battery cells.

The new TL high-type Exide-Ironclad battery cell for mine locomotive service was featured by the Electric

Type TL Exide-Ironclad Cell, Showing Construction



Storage Battery Co., Philadelphia, Pa. Type TL cell, the company says, is  $20\frac{1}{8}$ in. in height in sizes from 15 to 29 plates, or  $2\frac{1}{2}$  in. more than the Exide-Ironclad battery ordinarily used (Type MVA), and has 43 per cent greater capacity. The cells are interchangeable with MVA cells, plate for plate, where there is sufficient height in the battery compartment to accommodate the TL cell. Sizes from 11 to 41 plates are available. Capacity is 50 amp.-hr. per positive plate, against 34 amp.-hr. for the Type MVA cell.

National Carbon Co., Cleveland, Ohio, exhibited oxyacetylene welding equipment and gas, a tensile testing machine for welds, and carbon brushes.

### Mechanical Preparation Advances

Ten manufacturers of coal preparation equipment exhibited at the Cincinnati exposition, employing models, full-sized equipment, and pictures to tell their McNally-Pittsburg Manufacstories. turing Corporation, Pittsburg, Kan., featured the Norton automatic coal washer (Coal Age, January, 1932, pp. 5-6). Fairmont Mining Machinery Co., Fairmont, W. Va., displayed a working model of the Peale-Davis pneumogravity separator. Koppers-Rheolaveur Co., Pittsburgh, Pa., depicted the operation of the Rheolaveur washer by photographs and drawings. Link-Belt Co., Chicago, offered a model of the Link-Belt-Simon-Carves washer. Hydrotator Co., Hazleton, Pa., displayed a working model of the air-sand coal-cleaning equipment.

Roberts & Schaefer Co., Chicago. showed a working model of the Wuensch coal cleaner (*Coal Age*, February, 1932, p. 51) and displayed fuel produced by the "Kleen-Blox" process (*Coal Age*, April, 1932, p. 170). In addition, the company stressed its new "RandS Ro-Sieve" for fine-coal screening. This screen, according to the company, by a combination of a new form of drive and a rubber mounting gives a three-dimensional motion to the cloth plus a conveying motion, thus giving higher capacity on dry coal and facilitating efficient separation of much wetter coal than usual. Single- and double-deck models are available.

W. S. Tyler Co., Cleveland, Ohio, showed the new Type 70 "Hum-mer" electric vibrating screen for coarse and medium grades of material. The screening surface is supported on coil springs at the sides, as shown in the accompanying illustration. and, it is declared, the surface has full and unrestricted movement and no vibration is transmitted to the body of the machine. Higher capacity, casy adjustment of vibrators to suit material screened, and a low screen angle are stressed by the manufacturer. Also, it is claimed, the stratifying action produced by the vibrators drives the fines to the bottom, where they are given every opportunity of passing through the screen openings. The coarse material on top is said to keep the fines in close contact with the screen, and also to produce an effective scouring action. which prevents blinding.

Niagara Roller Bearing Screen Co., Buffalo, N. Y., showed examples of its line of screens. Hendrick Mfg. Co., Carbondale, Pa., offered a new flanged lip screen for use in separating fine bituminous coal. Minimum slot dimensions are: Axtex3 in. In addition the company offered lip screens, corrugated plates for vibrating screens, "Mitco" interlocked gratings, and perforated bronze and steel dewatering screen plate. John A. Roebling's Sons Co., Trenton, N. J., showed items from its line of woven-wire fabrics for screening. A No. 14 Deister-Overstrom "Diag-

A No. 14 Deister-Overstrom "Diagonal-Deck" coal washing table equipped with a "Concenco" white rubber cover, riffles, and motor drive was shown by the Deister Concentrator Co., Ft.



Construction Details, Spring "Hum-mer" Vibrating Screen

Wayne, Ind., in addition to a 4x9-ft. heavy-duty Leahy "NO-Blind" motordriven double-vibrator screen and photographs of table installations in both anthracite and bituminous fields.

Streeter-Amet Co., Chicago, offered for inspection a mine-car weigh scale equipped with an automatic weight recorder.

### Equipment for Safety Promotion

Safety aids, ventilating equipment, and explosives again claimed a large share of attention at Cincinnati, with a wide range of equipment on display. Mine Safety Appliances Co., Pittsburgh, Pa., showed inhalators, gas masks, firstaid equipment, safety lamps, electric cap lamps, trip lamps, portable floodlights, safety shoes and pacs, car stops, oxygen helmets, self-rescuers, "Skullgards" and "Doughboy" hats, and other equipment, including a new combustible gas indicator.

The new M-S-A indicator, according to the company, is a direct-reading instrument designed to sample and test flammable vapor-air mixtures quickly and accurately for explosibility, showing whether the atmosphere is below, within,

#### Construction Details, M-S-A Combustible Gas Indicator





"ProtectO-Spool" Electric Blasting Cap; Inside Paper Spool Surrounded by Wire

or above the explosive range. The indicator is direct reading and, it is said, only a few seconds are required for a test. Size is  $10x5\frac{3}{4}x10$  in., and as much as 60 ft. of sampling line may be used. Suitable harness is available for carrying the indicator from place to place.

Goggles, respirators, welding helmets, and hand shields were shown by Willson Products, Inc., Reading, Pa. The company featured its new chipping and welding goggles, which it says are designed to fit the contour of the face and are equipped with an easily adjustable chain bridge. Willson Products also featured the "Cover-All" goggles, designed for workmen who must wear correction spectacles. These goggles fit over the glasses, and are said to give full vision with maximum protection.

National Carbon Co., Cleveland, Ohio, displayed permissible flashlights and the U.C.C. methane detector. Safety and first-aid methods were demonstrated by



Robinson Gasoline-Powered Ventilator

the U. S. Bureau of Mines and the First-aid National Safety Council. and health conservation equipment was shown by Max Wocher & Sons, Cincinnati, Ohio.

Western Cartridge Co., East Alton, Ill., displayed fuse caps, electric blasting caps, and "ProtectO-Spool" electric blasting caps. In the latter, the cap is furnished inside a heavy paper spool. The wires are wound around the spool, giving, according to the company, greater protection from external forces and reducing the possibility of accidental discharge while the caps are being transported or handled. Outside end wires are shorted. Easier priming with this type of cap is emphasized.

Safe use of explosives was the theme of the exhibits of the Hercules Powder Co. and E. I. duPont de Nemours & Co., Wilmington, Del. Safety Mining Co., Chicago, displayed Cardox shells and demonstrated their use in breaking down coal.

Robinson Ventilating Co., Zelienople, Pa., stressed ventilating equipment for coal mines, and displayed a gasoline-driven model of the "Public-Service" blower, with a capacity of 1,000 c.f.m. through 100 ft. and 500 c.f.m. through 300 ft. of 8-in. tubing. The engine is equipped with magneto, floating carburetor, two-quart tank, weatherproof cover, and foot starter. Weight of the complete unit is 130 lb., and the discharge is said to be adjustable to eight positions. Electric-motor driven types also are manufactured, with motors totally inclosed if desired. The company also displayed one item from its line of man-cooling fans for use where temperatures are above normal.

The standard "Brownie" tubing blower, equipped with a new Westingtubing house SK totally inclosed 14-hp. ballbearing motor was displayed by the Brown-Fayro Co., Johnstown, Pa. This blower is normally rated at 1,500 c.f.m., and is adapted for use with 8-, 10-, and 12-in. tubing.

Langham roof jacks and Lorain timber jacks were displayed by the Lorain Steel Co., Johnstown, Pa. Gears were shown by the Tool Steel Gear & Pinion Co., Cincinnati, Ohio, and the Ohio Brass Co., Mansfield, Ohio. Link-Belt Co., Chicago, showed items from its line of power chain.

Treated timbers and treating methods and chemicals were emphasized by the American Wood Preservers' Association, Chicago. American Telephone & Telegraph Co., Cincinnati, Ohio, demonstrated the "Teletypewriter" communication system.

### Pumps and Pipe for Low Costs

National Carbon Co., Cleveland, Ohio, displayed a new chemical-carbon acidresisting pipe for use with chemicals, acid mine water, and other corrosive liquids. According to the company, construction of the pipe is such that it is non-porous and impervious to gases and liquids. Maximum working pressure for which the pipe is designed is 60 lb. per square inch. Crushing strength is 6,000-9,000 lb. per square inch, and the tensile strength is 600 lb. per square inch. Good resistance to shocks and blows is claimed by the company. Thermal expansion is said to be practically zero. Coupling equipment and methods, the company declares, give a joint as strong as the pipe itself, without reduction of inside diameter. Twoand 4-in. diameters in 10-ft. lengths are now being manufactured and other sizes are scheduled for production. Fittings to match are available.

### Industry Offers Coal-Mining Aids

Wire rope, lubricants, mechanical a revolving display showing the averpower transmission equipment, bearings, age size of bearings used in steel-mill and wood preservative materials were roll necks, a revolving display showing among the additional coal-mining aids exhibited at Cincinnati. Wire rope of all kinds was shown by the American Cable Co., Bridgeport, Conn.; American Steel & Wire Co., Chicago; Hazard Wire Rope Co., Wilkes-Barre, Pa.; and John A. Roebling's Sons Co., Trenton, N. J. Macwhyte Co., Kenosha, Wis., exhibited samples from its line of internally lubricated wire rope, and in addition displayed "preformed" ropes which it manufactures.

A. Leschen & Sons' Rope Co., St. Louis, Mo., stressed its new mining machine cable, "normalized" so that when the wires break they will not come out of the cable and cause injuries. The best of material and manufacturing methods have been employed, the company states, to insure longer life. Sizes are:  $\frac{1}{2}$ ,  $\frac{5}{8}$ , and  $\frac{3}{4}$  in.

Tyson Roller Bearing Co., Massillon, Ohio, displayed items from its line of roller bearings. Condon Bearings & Supply Co., Pittsburgh, Pa., showed its reground ball bearings for coal-mine equipment, and exhibited Fafnir and McGill ball bearings, and Timken and Hyatt roller bearings. Timken Roller modate co Bearing Co., Canton, Ohio, had on hand of plugs.

method of mounting bearings for standard railway service, and a standard mine-car truck showing bearing application.

Lubricants for coal-mining service were shown by the Hulburt Oil & Grease Co., Philadelphia, Pa.; Standard Oil Co. (Indiana), Chicago; Pure Oil Co., Chicago; and the Universal Lubricating Co., Cleveland, Ohio. National Carbon Co., Cleveland, Ohio, stressed its "Gredag" lubricant compounded of Acheson electric furnace graphite and high-quality grease, and made in 60 grades. Gredag lubricant, it is declared, lubricates exactly like any high-quality grease, and the graphite particles are said to prevent metal-to-metal contact, which establishes cohesion and results in scoring and seizing. In addition, it is declared that Gredag develops a heatand water-resisting bearing surface, which is wet by grease and oil much more easily than metal.

Brown-Fayro Co., Johnstown, Pa., showed a new, heavy-duty, hand grease gun designed for severe mining service. This grease gun, it is said, will accommodate connections for the various types



Austin 4x5 Inclosed Self-Oiling Piston-Type Mine Gathering Pump

Brown-Fayro Co., Johnstown, Pa., called attention to a new, inclosed, selfoiling, piston-type gathering pump embodying the Austin water end. Piston diameter is either 4 or 5 in., with a 5-in. stroke. Ball bearings are used throughout. Compactness, ease and efficiency of operation, and certainty of lubrication are stressed by the company, which also points out that the Austin water end is equipped with simple and efficient valve mechanism giving a smooth steady flow of water. Pump parts, strainers, and control equipment for centrifugal pumps also were shown by Brown-Fayro.

### NOTES

### from Across the Sea

IN Germany, a new drive for shaking conveyors has been devised that is said to give a movement to conveyor pans without any kick, thus reducing wear and tear and damage to the drive. This is obtained by the introduction of ec-centric gears, which give the necessary variable motion without sudden change in direction. This drive is described by E. Sauerbrey of Berlin-Wilmersdorf, in a recent article in *Glückauf*. He declares that compressed-air has advantages over electric drive for the operation of conveyor pans, but that the introduction of electricity for that purpose marks a distinct advance.

Herr Sauerbrey declares that with any method that uses a uniformly rotating crankpin connected to an oscillating shaft by an unusually short connecting rod causes excessive bearing pressures, necessitating large dimensions and considerably increasing friction losses and replacement of brushes. By the introduction of springs in the connecting rod, the forward stroke, due to the inertia of the conveyor, will continue after the driving pin has started to return, but

the shaft g. In the position shown the angular velocity of the driven wheel k is in the ratio of r: R, but after a revolution it is increased in the ratio R:r.

As a result, the velocity curve shown in Fig. 2 is obtained. One machine is made to deliver 35 tons per hour. It weighs 1,344 lb., including motor; actuates 262 ft. of conveyor trough; and re-quires 7 kw. The other machine delivers 50 tons per hour; weighs 2,670 lb., including motor; actuates 394 ft. of conveyor trough; and requires 14 kw.

ARCHES for the support of roof have evidently come to stay in Germany, for already there is an effort to design special shapes for the steel and to make definite specifications based on requirements. The United Steel Works, says Glückauf, has assisted a committee in preparing these plans and specifications. Tests have been made on arches set up on the surface, the loading being pro-vided by hydraulic pumps. Only broad-flanged beams will resist flange buckling when deflection occurs, according to the findings of the committee.



Conveyors

these springs, he says, are likely to be broken by the frequent reversal of stress.

The method of operation is illus-trated in Fig. 1. The coupling rod eis connected to the crankpin a. The crankshaft g, however, does not rotate uniformly, owing to the special gearing used. The constant-speed shaft h, driven through a double-reduction gearing from the electric motor, carries an eccentrically mounted elliptical wheel, i, which gears with a similar wheel, k, on



The shape of girder adopted (see Fig. 3) looks in cross-section like a wine glass with a broad base, a long stem and a funnel-like upper member. As a large quantity of steel is contained in the outer flange, the section resists pressure, buckling and warping. Mild steel is used having tensile strengths ranging from 41 to 48 tons per square inch instead of the annealed steel with a tensile strength of from 34 to 38 tons used for railroad rails, which usually have been employed for roof support.

The arch, constructed with steel of wine-glass cross-section, is said to be lighter, easier to handle, and narrower than railroad material and to take up less space in the roadways, thus leaving more space for the ventilating current. An arch weighing only 32 lb. per yard and with the sections fastened at the top of the arch with the new clamp stood up under a constant load of 30 tons without warping, whereas a similar arch with an ordinary strap joint failed. The State University, Columbus, Ohio.



Fig. 3-Wine Glass Girder Section for Steel Arches

clamp under pressure takes the load instead of allowing the bolts to sustain it.

The committee also has devised various cross-sections, some of which have a slight horseshoe effect, in that the distance between the right and left members at the ground is a trifle less than at some points higher up, a condition that some British engineers have not favored. But this difference is quite slight.

1. Dawson Hall

#### **Publications** Received

Combustion of Coal Dust, by A. L. Godbert and R. V. Wheeler. Safety in Mines Research Board. Paper No. 73; 21 pp., illustrated. Price 9d. net. Covers the results of research to determine the properties of coal dusts on combustion. H. M. Stationery Office, Adastral House, Kingsway W. C. 2, London, England.

Explosions in Washington Coal Mines, by S. H. Ash. Technical paper 507; 52 pp. Price, 10c. Bureau of Mines, Washington, D. C. Data on conditions that bear directly on the prevention of explosions are given, and mining conditions and practices relating to ventila-tion, gas and dust at Washington mines are discussed.

Methods and Apparatus Used in Determining the Gas, Coke and Byproduct Making Properties of American Coals, by A. C. Fieldner, J. D. Davis, R. Thiessen, E. B. Kester and W. A. Selvig. Bulletin 344; 107 pp., illustrated. Price, 40c. Covers work done under cooperative agreement between the Bureau of Mines and American Gas Association. Included are results on a Taggart-bed coal from Roda, Wise County, Va. Bureau of Mines, Washington, D. C.

Mine Explosions and Fires in the United States During the Fiscal Year Ending June 30, 1931, by D. Harrington. I. C. 6,540; 9 pp. Bureau of Mines, Washington, D. C.

Smoke and Its Prevention, by H. M. Faust. Engineering Experiment Sta-tion. Circular No. 24; 15 pp., illustrated. Issued in cooperation with Ohio Department of Industrial Relations and Ohio Ohio Coal Investigation Committee.

# **OPERATING** IDEAS .

# From Production, Electrical and Mechanical Men

### Electric Automatic Mine Door Designed To Meet Mine-Law Requirements

TO transfer labor to more useful When power is applied to the motor work and to eliminate some of the the centrifugal pump impeller turns and expense of door tending, the Susque- moves the oil from the top to the bothanna Collieries Co. designed and constructed an automatically controlled power-operated mine door of relatively power-operated mine door of relatively inexpensive type. Though, writes C. H. Matthews, electrical engineer of the company, the anthracite mining laws of Pennsylvania require that "All main doors shall have an attendant whose constant duty it shall be to open them for transportation and travel and prevent them from standing open longer than is necessary for persons to pass through," it nevertheless provides that a self-acting door may be used which is approved by the inspector of the district.

A balanced-pressure door was built having the two halves rigidly connected by a 14-in. pipe tierod and 12-in. radius arms. A turnbuckle is provided so that the doors will close properly. This tierod is located above the door and in the clear of the trolley wire which passes through a notch in the door lintel.

The power operator is a G.E. "Thrustor" which exerts a force of 600 lb. in a 6-in. stroke. This device, being compact, requires but a small mounting space at the side of the door. It consists of a vertically mounted tank filled with oil in which a motor-operated plunger moves. The plunger is in reality a centrifugal pump with two push rods connecting to the pump casing and extending out the top of the inclosing tank. The pump impeller shaft has a spline fit and extends into a hollow motor shaft with the motor mounted on top of the thrustor tank.

When power is applied to the motor tom of the thrustor tank. The pump therefore lifts itself upward in the oil

and exerts a thrust on the push rods. A special retarding baffle was provided for adjusting the speed of downward travel of the plunger when power is switched off the motor.

Connection of the thrustor to the door is through a 6- to 12-in. bell-crank, a turnbuckle pull rod, and a 12-in. radius arm. As the thrustor moves 6 in. ver-tically and exerts a thrust of 600 lb. the bell crank provides a 12-in. pull which is sufficient to open the door. Through the 6- to 12-in. bell-crank only a 300-lb. pull can be applied to the door. Since the thrustor exerts an upward



### Elementary Wiring Diagram With Automatic and Hand Control

Hand Control The 250-volt d.c. multi-finger relay used has two con-tacts normally open and one contact, B, normally closed. C and D are trolley switches (normally open but) closed by trolley wheel to open door. These switches to be located one on each side of the door, to open the door as the trip approaches. E and F are trolley switches nor-mally open but closed by trolley wheel to energize the relay so that opening of B will close the door. These switches are located one on each side of the door a suitable dis-tance away so that trip will clear the door before it starts to close. G and H are normally open momentary contact pushbuttons for hand control in opening door. I and J are normally open momentary contact pushbuttons for hand control in closing door. The ballast resistor for protection of 230-volt thrustor motor has taps for 250, 275, and 300 volts.

### Operating Ideas from PRODUCTION, ELECTRICAL and MECHANICAL MEN



Mine Door Assembly

push only, an adjustable counterweight cally open, when both the red and green is used to close the door. This counter-lamps are on together. But when the weight imposes an extra load on the door is completely open, the green lights threshot which retards its upward move- are on and the red are dark. Control of ment. By adjustment of the counterweight and the retarding baffle in the threstor any desired speeds can be obtained for both opening and closing the door. It was found that a counterweight of about 200 Jb, and an adjustment of the baffle gave a speed of 21 seconds for opening or closing the door. This speed is sufficiently rapid and does not cause any undue strains on the door or mechanism. Closing the door by counterweight, incidentally, falalls the require-ment of the mine law that doors "shall he so hung and adjusted that they will des amonticelly.

Power mast he maintained on the thruster while the door is in open position. It was therefore thought desirable to provide a safety catch to hold the door open in case gener tails while true is passing through the door. This safety catch is held up by a small magner which when deenergized allows a latch to drop and hold the door open. As the two halves of the door open

in convesite directions it was detined desirable to hang two safety chains, one on each half of the door, so that a man nitrouching the door sharps will walk toward the half of the door that moves in the same direction he is traveling.

Red and green lamps are located on each side of the door. The red humps remain lighted until the door is practi-

### Send Them In!

Readers are invited to contribute new ideas for consideration of publication in these pages. Accepted ideas are paid for at the rate of \$5 or more each. In preparing the material the writter should make himself clear, give the essential details, and explain the difficulties overcome. The manuscript should, of course, be illustrated either by bloeprint, pencil sketch, or photograph. If money or labor was saved, the amount should be stared or indicated.

the lamps is by a single-pole doublethrow switch connected by a lever to the thrustor bell-crank shaft. On the signal system the coil of a multi-finger relay takes the place of the thrustor motor starter and the relay contacts are used for controlling signal lights or bells.

Being of balanced pressure design, the door can be pushed open by hand, but pushbuttons are provided for opening or closing it from either side. Since the door can be operated by hand when required and the necessary safety devices have been furnished, a separate man door at the side of the poweroperated door need not be provided. This omission permits the location of doors in existing openings and saves the expense of enlarging gangways for their installation.

Pushbuttons for hand control can be located wherever desired. Automatic control is by contact of the trolley wheel of a locomotive with special trolley switches supported on standard trolleywire hangers, a scheme developed some time ago for block signals on mine haulage roads.

Where grades occur on haulageways the door should be designed so that it can be bumped open in case power fails as a locomotive coasts downgrade toward the door. The locomotive with train can usually be stopped on upgrade in time to prevent damage to the door, since the trolley control switches are installed suitable distances away from the door. their exact location being determined by the speed of the approaching train. Designs are being prepared for unlatching the door and allowing it to swing open in one direction by impact of a locomotive or mine car.

Because the door as constructed meets the letter of the mining law and because the necessary safety appliances have been provided, there should be no difficulty in getting approval from all local inspectors.

#### Shoveling Lift Over Car Lowered by Drop Sides

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At the time a certain Alabama mine was first opened, it appeared that the coal seam to be mined would have a thickness of not less than 4 ft., and mine cars having a height above rail of 38 in. were put in service. During a number of years' operation the seam was found to ran from 4 to S ft. in thickness. However, as the workings were extended to the west, the seam flattened out into a good-sized territory where the coal seam got down to as little as 40 in. In this coal, writes O. L. Lockwood, of Parrish, Ala., it was difficult, and in some cases impossible, to load coal over the top of the S-in, cars.

In order to avoid the necessity of haring two different sized cars in the mine,

### Operating Ideas from PRODUCTION, ELECTRICAL and MECHANICAL MEN



it was decided to hinge a part of the particularly opposite joints in the outside top sideboard on each side of the car so rail to relieve the latter of much of the that this board would drop down inside the car and thereby lower the loading height 8 in. After the car has been loaded up to the bottom of the hinged sideboard, this board is gradually raised until it reaches an upright position. In this way it is possible to load cars in rooms where the coal seam is just thick enough to admit the entrance of cars. The drop side also makes loading much easier in thick coal. Details of the hinge are shown in the accompanying sketch.

#### Check Rails Stop Derailments On Mine Curves

In the old days of mule haulage, few derailments of mine cars at curves occurred, the reason being, of course, that the cars were of small capacity, the haulage speed slow, and the "mule-power" low. These forces in combination did not exert sufficient thrust to spread and distort the rails. Today, with heavy equipment and fast haulage speeds, the track rail at curves are called upon to resist heavy centrifugal forces : yet the standards of mine track construction have not kept pace with the heavier service.

Pointing out this inadequacy, W. H. Luxton, of Linton, Ind., suggests a remedy used successfully in the mine of the Linton Summit Coal Co. and de-veloped by Jack Hayes, motor boss at this plant. A part of the suggestion is that heavier ties be used at curves and that they be placed on closer centers than for straight tread. Then inside than for straight track. Then inside check rails should be used on the curves.

thrust which spreads the gage and throws the track out of line.

The idea, as the sketch shows, is to use a series of short check rails, or guards, from discarded steel. These are placed close to the inside track rail, leaving only sufficient clearance for the inside wheels to turn without binding. To so place the check rail it is necessary to sink the regular rail in a shallow slot in the tie and lap the flange of the check rail over the flange of the track rail. This means that the check rail can be spiked on one side only, but experience

has shown that the check rail will not turn over when so anchored. The fact that the ball of the check rail is higher than the ball of the regular rail has been found to be an advantage.

Another practice in the maintenance of track at this mine is to use scrap rail



as stringers in places where the track shows a tendency to twist. In this case a length of the scrap rail is spiked inside and parallel to the regular track rails, at a distance of 8 to 10 in. from the rail which receives the least thrust. This third rail adds rigidity to the track, which is especially valuable at joints in the regular rails. It also helps in maintaining alignment of track on a bottom which pitches transversely to the center line of the entry.

#### Truck Tires Ease Lumps Onto Picking Table

Advantage is taken of every opportunity to reduce breakage at the Coal Creek mine of the Southern Collieries Inc., Coal Creek, Tenn. Retarders made from truck tires have been mounted at the lower end of the main screen to slow the lumps as they slide onto the

Rubber Bumpers Retard the Lumps



picking table and loading boom conveyor. As shown in the illustration, the sections cut from tires are nailed to a wood crosspiece clamped to the top edges of the shaker. At each stroke the tires swing upward to some extent, allowing the lumps to work under and between them. The point of maximum bending is reinforced and stiffened by a second thickness of tire wall material.

#### Injured Moved Safely in Cars With Stretcher Suspension

An ambulance car may be a good thing for underground accident emergencies, but it has its disadvantages and limitations. Low top may prevent its entrance into certain sections of the mine. Besides, it is not an easy matter always to get the ambulance quickly to the scene of the accident. For these reasons chiefly, the Dehue (W. Va.) mine of the Youngstown Mines Corporation prefers to use a simple stretcher carrier which can be hung within any available mine car for transporting the injured to the surface.

This stretcher carrier, writes C. A. Paller, safety inspector, is made up of two lengths of it-in. chain with a hook on each end which fastens over the car sides. Two links large enough to receive the feet of the stretcher are placed in the chain in an arrangement by which the stretcher is suspended in the center of the car and approximately 6 in. from the bottom.

This Scheme Makes Any Car Suitable for Transporting the Injured



Tension Springs in the Chains Absorb the Shocks in Rough Going





No Float Switch in This Signal System

track or faulty running gear, four 75-lb. tension springs are used. These are inserted in the chain midway between the stretcher and the sides of the car. The stretcher is otherwise made steady by persons who accompany the injured. The cost of making this stretcher is comparatively little and a set can be added to each stretcher station maintained in the mine. When properly prepared for transportation the injured can be removed from the mine with ease and without delay or danger of further injury.

#### Filling of Wash House Tanks Controlled by Signal

One man was eliminated from a twoman pumping job at a mine in Kansas by the installation of a simple signal system. Before the change, when water was pumped from the reservoir pond to tanks in the wash house, it was necessary to station a man at each end, because the two points were out of view of each other and separated by a dis-tance of 150 ft. When the tanks in To absorb any shock due to rough the wash house were full, the attendant

at this point called to the man at the

pump and apprised him of the fact. The feature of the signal system, writes Farrell Castellani, is that fixed terminals are used in place of a float switch, the circuit being closed through the body of water in one of the tanks. There are two steel tanks in the wash house. As shown in the sketch, these are connected by a pipe which allows water to flow from the first to the second in a leveling process that not only operates the signal but prevents overflow. When the light signal shows at the pump station, the pump is stopped. Falling of water in No. 1 tank opens the circuit.

#### **Remote Control Safeguards** Steam Engine

Because a large modern steam engine represents an appreciable investment, it is not well to rely on mechanical governors alone for protection against run-aways. A practical and inexpensive, manually controlled safeguard such as was applied to the engine which drives a 300-kw. generator at a West Virginia mine will give the additional protection desired.

Referring to the sketch, submitted by H. Farmer, a small drum is mounted on the stem of the valve controlling the steam supply to the engine. On this drum is wound a small flexible cable to which a 50-lb. weight is attached. This weight rests in a box with a hinged bottom which is opened by a tug on a rope to a latch. Sufficient slack is left in the cable above the weight to furnish a jerk for starting rotation of the valve stem. The control rope is put within easy reach of the hoisting engineer who pulls it at the first sound of excessive speed of the engine. A runaway with heavy damage to equipment led to this control.

#### A Gravity Weight Spins the Valve Closed



# WORD from the FIELD

#### Mines Get Into Action

Coal production at the new mine of the Leccony Smokeless Coal Co., on Tommy's Creek, in the Winding Gulf field of West Virginia, was expected to start on May 20. When development work is completed, the full production of 1,800 tons per day will be prepared in a steel tipple and washery constructed in 1931.

After a suspension of several months caused by destruction of the tipple by fire, the Nolan (W. Va.) mine of the Winifrede Block Coal Co. has resumed operations with 100 men. Two new drifts are to be opened, and production is to be increased, reports indicate.

Sinclair Coal Co., Kansas City, has completed the installation of an all-steel tipple and a Bucyrus-Erie stripping shovel at its mine near Huntsville, Mo., and will begin operations with 100 men.

## Oil Control Law Upheld

Authority of the Oklahoma Corporation Commission to proceed under the Oklahoma proration law, which, in substance, permits the commission to curtail or prohibit oil production at times when there "is not a market demand therefor at the well at a price equivalent to the actual value," was sustained by the Supreme Court on May 16. The court refused to give weight to the contention of the Champlin Refining Co. that the commission was attempting to fix prices; that it was limiting the quantity of crude entering interstate commerce for the purpose of controlling prices; and that oil production was interstate commerce.

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New contracts for topworks and construction under way or completed at various coal operations in May were as follows:

CLEMENS COAL Co., Pittsburg, Kan.; contract closed with the McNally-Pittsburg Mfg. Corporation for five-track steel upple equipped with three picking tables and loading booms, boney coal reclamation plant, and space for future coal washer; capacity, 300 tons per hour.

Capacity, 300 tons per hour. GUYAN EAGLE COAL CO., Amherstdale, W. Va., contract closed with the Link-Belt Co. for nut-coal preparation plant, consisting of belt conveyor, rescreen equipment, picking table, and loading boom; capacity, 75 tons per hour.

HUNTSVILLE- SINCLAIR MINING Co., Huntsville, Mo.; contract closed with the McNally-Pittsburg Mfg. Corporation for



four-track steel tipple equipped with three picking tables and loading booms, and a mixing conveyor; capacity, 300 tons perr hour.

PIONEER COAL Co., Pittsburg, Kan.; contract closed with the United Iron Works Co. for four-track steel tipple equipped with dump hopper, feeder, primary breaker, double-deck pendulum-type screens, crusher for steam coal, mixing conveyor, rescreens, picking tables, loading booms, degradation and refuse conveyors, and sulphur "rattler." Sizes to be prepared are: 1-in. slack, 1x3-in. nut, 3x8-in. egg, and 8-in. lump. Capacity of the plant is 400 tons per hour.

the plant is 400 tons per hour. WEST VIRGINIA COAL & COKE CORPORA-TION, Omar, W. Va.; contract closed with the Link-Belt Co. for vibrating screen equipment to separate ax8-in. coal from 11-in. slack; capacity 80 tons per hour.

#### Oil and Coal Taxes Passed

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Import taxes of ½c. per gallon on crude and fuel oil and 10c. per 100 lb. on coal, coke, and briquets were included in the tax bill approved by the Senate on May 31. The coal tax applies only to shipments from countries which in 1931 exported more coal to the United States than they received from this country.

### Coal Production Off

Bituminous coal production, reflecting slackening demand and strikes, dropped to 18,394,000 net tons in May, according to preliminary estimates by the U. S. Bureau of Mines. Output in April was 20,300,000 tons, while in May, 1931, production was 28,314,000 tons. Anthracite production dropped to 3,286,000 net tons in May, against 5,629,000 tons in April and 5,005,000 tons in May, 1931.

Total production of bituminous coal for the first five months of 1932 was 108,455,000 tons, a decline of 32.4 per cent from the output of 160,-612,000 tons in the corresponding period of 1931. Anthracite production in the first five months of 1932 was 18,334,000 net tons, a decrease of 32.1 per cent from the corresponding 1931 figure of 26,998,000 tons.

### Canada Grants Coal Subsidies

Nova Scotia coal producers report orders for considerable tonnages as a result of the offer of the Canadian government to pay subventions of  $\frac{1}{7}$  to  $\frac{1}{2}$ c. per ton-mile, maximum \$1 to \$2 per net ton, on shipments of other than railroad coal from the Maritime Provinces to points in Quebec and Montreal. This action was taken to allow competition with imported coal. On railroad fuel water-borne to points west of Montreal, the subvention is \$1 per ton; and on all coal bought by carriers for their own use at points in Quebec and Ontario, the subvention is the difference in the laiddown cost of Maritime and imported coals up to \$2 per ton for purchases in excess of 1931 totals.

#### **Coal Stocks Decline**

- -----

Commercial stocks of bituminous coal, used largely for industrial purposes, totaled 30,050,000 tons on April 1, 1932, according to the quarterly survey of the U. S. Bureau of Mines. This is a decline of 5,450,000 tons from the Jan. 1 total, but an increase of 1,000,000 tons over the quantity on hand on April 1, 1931.

#### Coal Control Plan Urged

------

Creation of a commission for "regulating the amount of coal to be produced to the reasonable demands of the market" was urged last month by George H. Theiss. Pittsburgh, Pa., president, Duquesne Coal & Coke Co., who recommended that Governor Pinchot sponsor legislation for the commission at the next regular meeting of the Pennsylvania General Assembly. Mr. Theiss was of the opinion that Pennsylvania could not proceed alone, and that all bituminous states should join in the movement.

#### Old Home Week for Morris Run

-0-

Celebrating the 100th anniversary of the discovery of coal at Morris Run. Pa., the home of the Morris Run Coal Mining Co., plans have been announced for an Old Home Week to begin on July 3. First houses were built on the townsite in 1853, and within one year mining was started, and in 1864 the operations were taken over by the present Morris Run company. Population is now 1,500. The mines produce 1,000 tons daily. Charles G. Morgan, superintendent of the Morris Run company, is chairman of the committee on arrangements.



#### Honoring a Safety Record

D. Harrington, chief engineer, safety di-vision, U. S. Bureau of Mines (left), presents the Joseph A. Holmes Safety Association certificate of honor to Roy Hand, representing the Miners' Safety Commit-tee, and Daniel Holahan, superintendent, Brookside Colliery, Philadelphia & Read-ing Coal & Iron Co. Walter H. Glasgow (right). Secretary of Mines for Pennsylvania, looks on.

#### **Coal Mine Fatalities Decline**

Coal-mine accidents caused the death of 47 bituminous and 32 authracite miners in April, 1932, according to information furnished the U. S. Bureau of Mines by state mine inspectors. This compares with 76 bituminous and 24 anthracite fatalities in March, and 81 bituminous and 45 anthracite deaths in April, 1931. The death rate per million tons in bituminous mines declined to 2.32 in April, 1932, while the anthracite fatality rate increased to 5.69. Comparative figures are as follows:

#### **Bituminous** Mines

	April, 1932	March. 1932	April, 1931
Production, 1.000 tons	20.300	32,500	28.478
Death rate per 1.000,000 tons	2.32	2.36	2.84

#### Anthracite Mines

Production, 1,000 tons	5,629	4.789	5.700	
Fatalities.	32	24	45	
Death rate per 1.000,000 tons	5,69	5.01	7.89	

Comparative fatality rates for 1932 and 1931 are given in the following table:

> Fatalities and Death Rates at United States Coal Mines, by Causes\* January-April, 1931

> > Killed per 1,000,000

Tons

2.903

1.648

. 310

.038

113

. 257

2.914 1.595 .443

018

406

January-April, 1932

-Bituminous

Number

Killed

384

218

41

15

173

48

44

37

#### Consolidation Honors Anderson

Honoring his activities while president of the Consolidation Coal Co., representatives of the official staff presented George J. Anderson, who resigned in May, a testimonial of appreciation at a meeting in the New York offices last month. Robert C. Hill, chairman of the board, presided, and the testimonial was presented by H. H. Snoderly, vice-president. F. R. Lyon, vice-president in charge of operations, tendered an engraved platinum wrist watch as evidence of the regard of his associates.

### -0-Personal Notes

JOHN L. STEINBUGLER, secretary, has been elected president of W. C. Atwater & Co., Inc., New York. Mr. Steinbugler succeeds WILLIAM C. ATWATER, who was chosen chairman of the board.

EDWARD JOHNSON was made chairman of the board of the Lorado Coal Mining Co. last month in a program of personnel changes, while R. L. SEITH was made secretary - treasurer, succeeding W. M. Amos, deceased. R. L. PHELPS was ap-pointed assistant to Mr. Seith. S. B. JOHNSON, vice-chairman of the Lorain Coal & Dock Co., Columbus, Ohio, was elected president of that company, vice F. W. Braggins, resigned.

B. W. SNODGRASS, Denver, Colo., for several years president of the Victor-American Fuel Co., resigned his position in May.

L. R. WEBER, general manager, Liberty Fuel Co., Salt Lake City, Utah, has been elected president of the company, succeeding the late Frank Latuda. GEORGE A. SCHULTZ, general superintendent, has been made vice-president.

L. F. SANNER, formerly superintendent of the northern division of the Pittston Coal Co., Scranton, Pa., has been made general superintendent over both of the operating divisions of the company.

HARRY BOWEN, Bramwell, W. Va., was elected chairman of the board of the Pocahontas Fuel Co. in May, and O. L. ALEX-ANDER, former vice-president in charge of sales, was chosen president, succeeding the late Isaac T. Mann. Col. JAMES ELLWOOD JONES, Switchback, W. Va., was reelected

- Total

Number

Killed

537

200

89

6

41

16

408

224

62

13 15 48

Killed per 1,000,000

Tons

3.480

1.938

.039 .266 .103

. 103

3.218 1.767 .489

.016

. 347

.102 .118 .379

-Anthracite

153

81 18

6

36

51

8 3

16

Killed per Number 1,000,000 Killed Tons

6.957 3.683 .818

. 273

500

046

1.637

5.018

2.782

436

.164



George J. Anderson

vice-president in charge of operations, a H. R. HAWTHORNE, New York City, v chosen to succeed Mr. Alexander, retain his position as secretary. Mr. Bowen a is president of the Booth-Bowen Coal Coke Co., Freeman, W. Va.

IVOR MASSEY, president, Massey, Wo & West, coal retailers, Richmond, Va., v elected president of the National Rel Coal Merchants' Association at the nual meeting held in Louisville, Ky., 1 month.

### ------Industrial Notes

INDUSTRIAL SALES Co., Cincinnati, Oh has been formed to represent manufa turers of industrial, contracting, and ra road equipment. W. F. ROBINSON, for merly sales engineer for the Weir-Kil Corporation, is president, and P. BAUER is vice-president.

T. H. EDELBLUTE Co. has removed general offices to the plant at Reynold ville, Pa.

AMERICAN CABLE Co. has grant licenses for the manufacture of preform wire rope to the Macwhyte Co., Kenosl Wis., and the Wickwire Spencer Ste Corporation.

GENERAL CABLE CORPORATION, NO York City, will market all of the produc of its component divisions, which heret fore have borne individual trade name under the name "General Cable."

H. J. RITTER, assistant secretary. Norm Hoffmann Bearings Corporation, Stamfor Conn., has been made sales manager the company.

#### Permissible Plates Issued

Two approvals of permissible plates were issued by the U. S. Bureau of Mines in April, as follows:

(1) Goodman Mfg. Co.; Type 624-CJ slabbing machine; 50-hp. motor, 210 volts, d.c.; Approval 242; April

(2) Mine Safety Appliances Co.; M-S-A Model F-2 signal lamp, Ap-proval 1009; April 5.

Explosives. Electricity. Surface and miscellaneous. 295 \*All figures are preliminary and subject to revision.

Cause

All causes Falls of roof and coal... Haulage. Gas or dust explosions: Local explosions....

Major explosions.... Explosives. Electricity. Surface and miscellaneous

Falls of root and coal. Hanlage. Gas or dust explosions: Local explosions.

Major explasions.

All causes

All causes

### Opposition to Davis-Kelly Bill Widespread; Union Scores Foes as Hearings End

H EARINGS on the Davis-Kelly bill before the Senate subcommittee on mines and mining at Washington, D. C., ended June 2 with bitter attacks upon the National Coal Association by John L. Lewis, president, and Henry Warrum, counsel, United Mine Workers, during which the former admitted that the bill "is designed to permit the utilization of the strength and influence" of his or-ganization in "stabilizing" the bituminous coal industry.

Operators testifying in May, however, joined in declaring that the bill would throw control of the industry into the hands of a government commission which would be faced with an almost impossible task in attempting to coordinate and unify production, sales and management policies of competing districts. Higher prices, they contended, would be inevitable, mak-ing coal still more vulnerable to the inroads of unregulated competitive fuels.

Producer after producer voiced the fear that administration of the proposed law would lead to zoning of consuming areas to the great financial detriment of districts which ship the bulk of their output interstate and would pauperize many counties which depend upon the mining industry for most of their tax revenues. This view on tax returns was supported by W. J. Kyle, counsel for the Greene County

(Pennsylvania) Commissioners. "Compulsory unionization" was scored by several witnesses who recited past bitter experiences, including broken contracts and deliberate curtailment of production of individual workers. The only inducement in the bill for accepting union domination-permission to organize selling poolsalready was provided by the industry itself, they said, in Appalachian Coals, Inc., and other joint selling agencies which would be created if the courts held the venture legal. If further relief is to be afforded the industry, they argued, let it be in modification of the anti-trust statutes. High freight rates also were cited as a burden on coal mining.

Among the witnesses who developed these arguments were: W. P. Belden, Eastern Ohio Coal Operators' Associa-tion; D. C. Botting, Coal Operators' Committee and Federated Industries of Washington; J. G. Bradley, Elk River Coal & Lumber Co.; C. A. Cabell, Carbon Fuel Co.; L. C. Cosgrove, West Virginia Fuel Co.; J. C. Cosgrove, West Virginia Coal & Coke Corporation; S. J. Dicken-son, Mary Helen Coal Corporation; Howard N. Eavenson, Clover Splint Coal Co.; Charles L. Estep, Logan Coal Operators' Association; Milton H. Fies, DeBardeleben Coal Corporation; Ashton File, New River Coal Operators' Association; E. L. Greever, National Coal Asso-ciation; H. R. Hawthorne, Pocahontas Fuel Co.; R. M. Hite, Virginia & Pitts-purch Coal & Co. D. L. Leibard burgh Coal & Coke Co.; R. L. Ireland, Ir., Hanna Coal Co.; Herbert E. Jones, Logan County Coal Corporation; D. C. Kennedy, Kanawha Coal Operators' Asso-ciation; A. J. King; W. E. E. Koepler, Pecahontas Operators' Association; Lee Long, Clinchfield Coal Corporation; E. C. Mahan, Southern Coal & Coke Co.; K. U. in the Davis-Kelly bill.

Meguire, Dawson Daylight Coal Co.; R. H. Morris, Gauley Mountain Coal Co .: W. L. Robison, Youghiogheny & Ohio Coal Co.; R. Templeton Smith, Pittsburgh Coal Co.; W. P. Tams, Jr., Gulf Smokeless Coal Co.; E. L. Thrower, W. H. Warner & Co.; L. E. Woods, Crystal Block Mining Co.

Fear that zoning and price fixing would mean higher costs to the consumer and further losses of tonnage to competitive fuels was echoed by Milton E. Robinson, Jr., retiring president, and Ivor Massey, president-elect, National Retail Coal Merchants' Association; Roderick Stephens, Stephens Fuel Co., New York City; and D. H. Pape, Pratt Coal Co., Boston, Mass. Interference with orderly buying and increased prices were foreseen by Carl D. Jackson, American Gas Association; John C. Graham, Michigan Manufacturers' Association; and Francis J. Dowd, Associated Industries of Massachusetts. The bill, if enacted, would presage regulation of other private industries, protested J. A. Emery, National Association of Manufacturers. J. H. Hanna reiterated the opposition of the Chamber of Commerce of the United States to permanent government regulation of private enterprise.

Disruption of present district relationships, which would endanger railroad earnings and investments, was prophesied by C. S. Duncan, Association of Railway Executives; F. M. Whitaker, Chesapeake & Ohio Ry.; and J. M. Dewberry, Louisville & Nashville R.R. Railroad witnesses condemned the provisions of the bill relating to the opening of new mines, declaring that these provisions would render much of the investment in coal-hauling facilities valueless.

R. H. Sherwood, Central Indiana Coal Co., agreed with the principle of government guidance, but did not approve the bill in its present form. Mr. Sherwood recommended changes in the appointment of commissioners, incorporation of both labor and operators' organizations equally subject to the laws of contracts, formation of tribunals to settle labor disputes, licensing of labor organizations, some decen-tralization of both labor and operators' organizations, and a relaxation in proposed restrictions on new mine openings.

Seventy-year-old anti-social policies are responsible for present uneconomic wage rates and furnish evidence that the bituminous industry is incapable of self-regulation, declared K. C. Adams, economist. United Mine Workers, in supporting the bill. No plan of betterment devised by the operators, he contended, can succeed unless it is based on collective wage agreements and a minimum scale. Objection to possible higher prices as a result of necessary regulation, he said, is without merit.

In his closing attack, Mr. Lewis assailed Illinois operators who control non-union companies and also asserted that the present financial position of several companies in other fields was due to their repudiation of the union. Mr. Warrum's testimony consisted largely of a constitutional defense of the licensing plan set up



The Late Joseph D. Zook

#### Illinois Leader Dies

Joseph Dudley Zook, 47, president and commissioner, Illinois Coal Operators' Association, Chicago, died suddenly of a cerebral hemhorrhage at a hospital in Springfield, Ill., May 28, after being stricken in the lobby of a downtown hotel. Mr. Zook was born in Farmington, Ill., and engaged in railroad work until 1918, when he became vice-president of the Illinois Coal Corporation. Ten years later he was elected president and commissioner of the Illinois Coal Operators' Labor Association, later the Illinois Coal Operators' Association.

#### Consolidation in Receivership

Following default in interest payments on its first and refunding mortgage 40-year 5 per cent sinking fund gold bonds. Robert C. Hill, New York, chairman of the board; F. R. Lyon, Fairmont, W. Va., vice-president in charge of operations; and Howell Fisher, Baltimore, were named receivers for the Consolidation Coal Co. by Federal Judge W. C. Coleman, Baltimore, June 2. Depression and lack of liquid assets were blamed for the company's difficulties.

### **Coming Meetings**

------

Southwestern Interstate Coal Operators' Association: annual meeting at 300 Keith & Perry Bldg., Kansas City, Mo., June 14.

Colorado and New Mexico Coal Operators' Association; annual meeting. Boston Building, Denver, Colo., June 15.

American Society for Testing Materials; annual meeting, June 20-24, Atlantic City, N. J.

American Institute of Electrical Engineers: annual summer convention, Cleveland, Ohio, June 20-24.

Rocky Mountain Coal Mining Institute; annual meeting, June 22-24, at Salt Lake City, Utah.

Mining Society of Nova Scotia; annual meeting at Baddeck, N. S., June 28-9.

#### Obituary

### Illinois-Indiana-Ohio Deadlock Continues; West Virginia Agreements Renewed

ILLINOIS operators and miners continued their watchful waiting policies in May. No attempts were made to reopen negotiations for a wage agreement, but unofficial reports current at the end of the month indicated that conferences would be resumed in the next few weeks. With the exception of the strip mines, many of the small shaft operations, and a few large deep mines operating under temporary agreements, Illinois plants remained closed.

Little change was apparent in Indiana in May. Negotiations for a new agreement continued in abeyance, though the Deep Vein Coal Co., Princeton, resumed work under the old scale of \$6.10, marking the first break in the ranks of the shaft operators. Cooperative mines and strip operations continued to produce, as in the preceding month.

National Guard troops moved back into the eastern Ohio field on May 24 after 1,000 pickets attacked men on their way to work at the Lick Run mine of the Manhattan Coal Co., Nelsonville, which was the first of the large operators to accept the terms of a settlement proposal made by Governor White on May 17. The Governor's plan included the declaration of a truce for one year, a wage scale of 38c. per ton for loading and \$3.28 for day labor, and no further reductions without 30 days' notice. Miners, under the guid-ance of United Mine Workers' officials, rejected the plan on May 25 at a meeting at Jacksonville, preferring to fight for union recognition. The Black Diamond Coal Co., Lathrop, prepared to reopen under the Governor's terms on May 31. Mines of the Wheeling Township Coal Mining Co., Adena, and the Muskingum Coal Co., Zanesville, continued to operate in May, together with a number of operations in the Tuscarawas and Cambridge fields and wagon mines in the Hocking Valley. Northern West Virginia Panhandle mines also ran in May, though picketing cut down production.

Thirty-eight operators in northern West Virginia renewed contracts with the United Mine Workers on May 31. The new agreement extends for one year the old wage scale, as follows: loading, machine sections, 22½c. per ton; pick mining, 28½c. per ton; motormen, trackmen, and timbermen, \$2.70 per day; other inside labor, \$2.40; pickers, \$1.80; tipplemen and other outside labor, \$2.10.

Hearings on the Costigan-Cutting resolution for an investigation into conditions in the Kentucky coal fields began before a subcommittee of the Senate Manufactures Committee on May 11. Howard N. Eavenson, president, Clover Splint Coal Co., detailed. on May 19, working and living conditions among Harlan miners and declared that "unprejudiced and impartial" investigation would be welcomed. No action on the resolution was taken in May.

Operators in Ray and Clay counties, Missouri, were reported to have reached an agreement with the United Mine Workers on May 28, ending a controversy over union recognition which has paralyzed the industry in those districts for months. If approved by the miners, the agreement will permit resumption at twelve mines

in the field which have been closed down. The United Mine Workers embarked on an organization campaign in Arkansas and Oklahoma in May, under the leadership of International Representatives David Fowler and G. E. Mikel. Appeals were made to business men, merchants, operators, miners, and citizens for expressions of sentiment on the project.

Representatives of the United Mine Workers in Wyoming agreed to the operators' request for a wage reduction of approximately 20 per cent late in May. This action climaxed a deadlock of four weeks, which followed the breakup of a joint wage conference late in April. Intervention of three international board members is credited with changing the miners' views on reducing the basic wage scale from \$6.72 to \$5.42 per day.

The Colorado Industrial Commission, in a decision on May 7, disapproved the cut from \$6.72 to \$5 per day in the basic scale posted by members of the Northern Colorado Coal Operators' Association last month, though it has no power to enforce its ruling. Cessation of price cutting, organization of miners for collective bargaining, maintenance of right to elect checkweighmen and miners' committees to investigate working conditions were recommended by the commission.

Members of the Nova Scotia branch of the United Mine Workers voted last month to accept the wage reductions of 10 per cent for day workers and  $12\frac{1}{2}$  per cent for day men awarded them by the Duncan Commission, and returned to work on May 27.

#### C. H. JENKINS, 61, vice-president, Hutchinson Coal Co., Fairmont, W. Va., was killed in an automobile accident near Romney, W. Va., last month. Mr. Jenkins joined the Hutchinson company in 1898 as a clerk, and was made vice-president in 1917.

C. E. BERTIE, assistant general manager, Virginia Iron, Coal & Coke Co., died May 14 at Roanoke, Va., following an attack of acute appendicitis.

JARIUS COLLINS, general manager of the Greenbrier Coal & Coke Co., died May 18 at his home in Bramwell, W. Va. Mr. Collins was born in Alabama in 1859, and for many years was active in the development of coal properties in southern West Virginia.

ISAAC T. MANN, coal operator and banker, died at his home in Washington, D. C., May 18, at the age of 69. Mr. Mann, at the time of his death, was president of the Pocahontas Fuel Co., which he founded, and also was head of the Greenbrier Coal & Coke Co. and the Beaver Creek Consolidated Coal Co.

ENOCH BELLIS, president and treasurer. Berryburg Coal Co., Berryburg, W. Va.. died at his home in Buckhannon, W. Va.. June 2. Born in North Wales in 1871, Mr. Bellis came to this country at the age of ten and was for many years associated with his father in the operation of David E. Williams & Co., Forge Coal Mining Co., Cymbria Coal Mining Co., and Urey Ridge Coal Co., in Pennsylvania, and later was interested in the Springfield Coal Corporation, Nanty Glo. On giving up his Pennsylvania interests, he located at Buckhannon and organized the Berryburg Coal Co.

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