COAL AGE

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

SYDNEY A. HALE, *Editor*

New York, May, 1933

"Twice-Told Tales"

WHEN CONFIDENCE is low and the spirit of business adventure faint, the disposition to underrate achievement and discount industrial progress is strong. The misfortunes which may have overtaken a few attempts to embrace new methods and new equipment are magnified to justify the inertia of the timorous. Analysis finds little place in these pessimistic exaggerations. Were such analysis made, it would disclose that the failures stressed in nowise challenge the fundamental soundness of modernization.

Overemphasis of this character, however, works real havoc, since it inevitably distorts the facts and leads to false conclusions. In the coal-mining industry, where conditions wholly apart from the present depression make continuous modernization imperative, acceptance of a defeatist attitude toward the necessity for further progress would be incalculably dangerous. Moreover, the roster of companies that have improved their competitive position through modernization is too large to be ignored by those who want a true picture.

Most of these improvements were first reported in these pages when the individual programs were in the early stages of development. But the record as a whole is so impressive that it bears reiteration. The major editorial content of this issue of *Coal Age,* therefore, presents a series of case studies which bring down to date the developments in the modernization program of a number of these companies.

These twice-told tales—although obviously only a fragment of the volume which might be assembled—are wide enough in scope and variety to give an incontrovertibly affirmative answer to the question: "Does modernization pay?" They are tales not of new experiments but of achievements seasoned by time and experience.

Hours and Wages

DISMISSED LIGHTLY at the start as a legislative impossibility, Congressional proposals to regulate hours and wages now claim the feverish attention of disturbed industrialists and uneasy labor leaders. From the original Black bill fixing a 30-hour week for manufacturers and mines shipping in interstate commerce, the program has been broadened to cover individual and group industrial minimum wages and production control. Leisurely academic discussion of national industrial planning has been pitched incontinently into the political arena.

That the bill now before the House Committee on Labor is loosely, even ineptly, drawn is an incidental detail which easily can be corrected. To center attack on that detail is to overlook the main point. What is important for business to recognize is that a philosophy of social control of industry through government supervision formerly considered by the majority alien to the American spirit of rugged individualism—and still so considered by many—has the sympathy, if not at this time the pledged support, of the national administration. And this situation has been made possible by a growing, widespread irritation and resentment against price chiseling, wage butchering, increasing and tragic unemployment, and the too frequent absence of industrial cohesion.

Raging against this philosophy as socialistic or communistic will get industry nowhere except, possibly, into a federal straitjacket. If

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business is to preserve self-regulation of industry, it must present something more constructive for consideration than a parrot-like policy of negation—and do it quickly!

Coal Competition in 1950?

CONSUMPTION of coal in the United States in 1950 will be approximately 3.4 per cent less than it was in 1930, while petroleum consumption will have increased 63.4 per cent, and natural gas, 95.8 per cent; this is the cheerful picture presented by W. Spencer Hutchinson and August J. Breitenstein in a paper on "The Competitive Relation of Coal and Petroleum," at the recent midwinter meeting of the American Institute of Mining and Metallurgical Engineers. Despite the decline in coal tonnage, the effective energy supply from coal in 1950 will be 6,760 trillion B.t.u. —an increase of 24.2 per cent over 1930 and still, by the scant margin of 190 trillion, the major source of effective energy.

How close these forecasters are to actuality no one can definitely determine for seventeen more years. As late as 1930, John B. Dilworth was suggesting that in 1940 the country would be calling for an output of 800,000,000 tons of bituminous coal alone; the Hutchinson-Breitenstein estimates cited cover both anthracite and bituminous. Unforeseen events have a disconcerting way of confounding the long-range prophets. Already, for example, the population curve upon which some of the latest figures are based has been written down by the experts whose studies of vital statistics make one of the most interesting chapters of "Recent Social Trends."

A substantial part of the sharp increase in the use of petroleum as a source of energy must be attributed to the automobile, which at best is only indirectly a competitor against coal in the energy field. Is it unreasonable to suppose that we are closer to an automobile saturation point, which will change materially the petroleum trend? The old rule that coal production approximately doubled every ten years no longer holds true; may it not be that the present predictions on the growth of natural-gas consumption also will lose their validity after the flush of the recent renaissance in the use of that fuel has faded?

As students of coal economics are painfully aware, inroads of competitive fuels and much of the zeal for increased efficiency in the combustion of coal were facilitated by high prices and fears that the supply would not be commensurate with demands. Today nobody worries about coal supply and mine prices have fallen so low that many of the investments in combustion equipment to extract the last B.t.u. no longer earn dividends. Though it is difficult to measure their effect statistically, these are factors which cannot be ignored. Finally, there remains the still unanswered question of what research will do to broaden the market for coal as a raw material.

Unknown Factors in Coal's Realm

A STUDY of the visible and invisible spectrum of the coal fire should supply data for an increase in its use. What rays does it furnish, and what thermotherapic value do they have? Even if the practical value of its rays can be clearly determined, these facts will not have the effect on the mind of the public that a more scientific exposition of the operation of its rays will produce. We might have evaded the entire subject of violet rays, vitamins and chlorophyll, and merely discovered that a vegetable and milk diet was of great value for the human system. But the whole story of the action of light rays has proved more instructive—and intriguing—and, perhaps in the end, more practical.

Theoretic research reacts on practical, and makes it more complete, if more complex, and the public prefers to remember that vitamins are healthful rather than that spinach has that quality. So the indirect approach to the value of the radiance of coal may have more fundamental effects than a mere study of the effects themselves.

Laugh as the public may at the theoretic and scientific, eventually it learns to like to mouth its long words and use its language. The more explicit, the more convincing. The age-old knowledge that land benefited by the addition of vegetation and thereby developing fertilizing vegetable mold has been almost forgotten and has even been questioned, because the story of chemical fertilizers has been so scientifically developed and explained. All of which leads back to the necessity for finding theoretic data regarding the rays of burning anthracite as well as practical information as to their effects on the human organs.

+ THIN SEAMS

No Obstacle to C. B. C.'s Mechanization Program

Thin seams and weak roofs are only additional spurs to management whole-heartedly sold on the cost-reduction possibilities of mechanization. The Clearfield Bituminous Coal Corporation began to explore these possibilities as far back as 1924. One phase of these activities was told in *Coal Age* several years ago. Progress, particularly in conveyor mining, has been accelerated greatly in the past three years. The article which follows brings the story down to date. Outstanding results include a 26 per cent reduction in payroll costs (exclusive of wage changes) and lower accident frequency and severity rates.

MECHANIZATION drew its first breath in mines where coal was thick and the roof strong. One of the early pioneers in the maunfacture of loaders declared that if the coal to be mined was not thick enough or the roof sufficiently reliable, the operator might as well quit operating, for the new machines would soon drive him out of business.

But time has shown that thin coal is perhaps more benefited by the appropriate type of mechanization than thick coal, and that weak roof, though a hampering difficulty, is an obstacle that by proper contrivance can be overborne. The Clearfield Bituminous Coal Corporation, of Indiana, Pa., has coal ranging usually between 3 ft. and 3 ft. 6 in. in thickness with a tender roof, such as is frequently found where, as here, the Upper and Lower Freeport coals are operated. These beds frequently have a roof of boney coal, shading off to carboniferous shale, with marked ferny laminations and frequent slickensides of a treacherous character, sometimes made more hazardous still by being overlaid by a loose bed of slate.

Yet mechanization has made progress year by year and accidents are decreasing. In *Coal Age*, September, 1928, Vol. 33, pp. 530-531 and 536, details were given of this operation. Other less elaborate references have been made since that time. It would be well to note the changes in methods and the growth of mechanization in recent years. That growth has been slow but steady since 1924; only in 1929 was there any recession, and that small. The figures in the table show the progress made.

Mechanized Tonnage, Clearfield Bituminous Coal Corporation

Year	Mechanized Tonnage	Total Tonnage	Percentage
1924.....	5,600	1,610,023	0.35
1925.....	10,618	1,357,524	0.78
1926.....	17,265	1,741,660	0.99
1927.....	50,623	993,866	5.09
1928.....	83,427	1,228,216	6.79
1929.....	60,067	1,486,921	4.04
1930.....	229,312	1,461,778	15.69
1931.....	539,228	1,405,005	38.38
1932.....	629,526	1,175,224	53.57

With thin coal, the pressing problem usually is how to drive entries fast enough that a profitable tonnage can be maintained. In early days, when coal was dug from under the rounding knobs of hills, it was possible to drive a half dozen or more drifts from the surface, and thus get a production such as early operators deemed satisfactory — even large. But when mines began to penetrate, or to be actually opened in, large bodies of coal, the thinness of the seam made development, as rated by area exposed to operation, desperately slow, and as rated by tonnage developed, even slower. Few mines in thin seams reached projected output proportions.

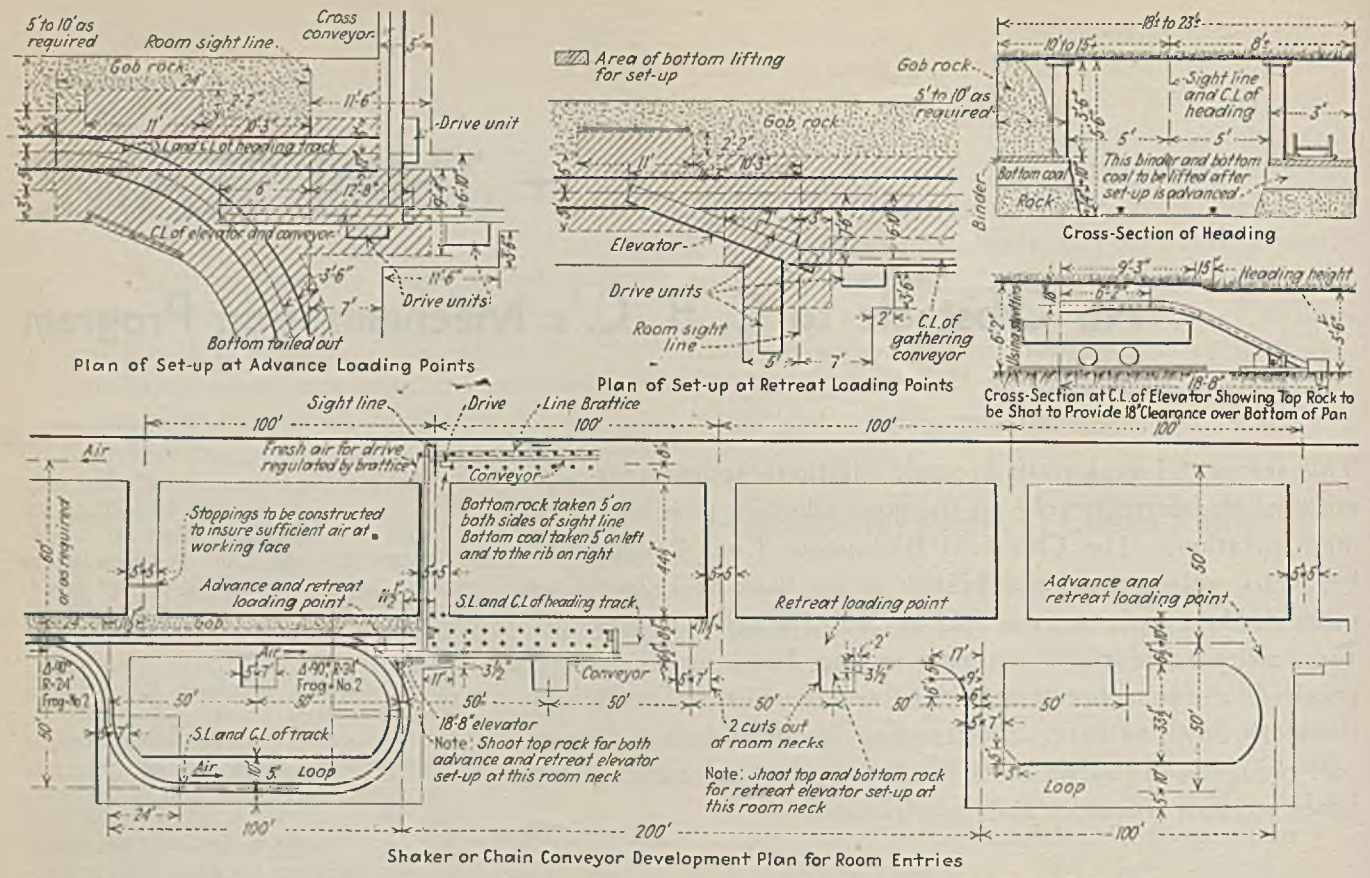
Thus it was that the Clearfield Bituminous Coal Corporation found it necessary in 1924 to make experiments with machines, arguing that, if entrymen could muck out the rock promptly, the headings would be more rapidly advanced. Coal also was thus loaded.

But headings are stub ends and only one car at a time could be spotted for loading; the inevitable need for a continuous flow of coal from loader to mine car did not fail to present itself. At first the plan was, as already described in the article to which reference has been made, to advance the headings for a distance of about 300 ft. at a stretch without shooting down top or lifting bottom, the coal being brought by some kind of conveyor or scraper to the already heightened part of the heading, where a crosscut had been provided leading to the back heading. By rounding the angles of the pillar into a semicircle and putting a track through to the back heading, continuous loading could be provided at this point for an entire trip, coupled all ready for hauling to the tipple. This cut down the idle minutes during which the loaders can only fuss and fume and wait.

However, in driving headings in mines making some gas, the air would pass through the crosscut from main to back heading, and thus would short-circuit the face; so this method failed signally for application to gassy workings. One could not even partially seal an opening through which the cars were kept moving.

Consequently, not only must a place be found where a circular track could be located and cars could be fed with a continuous flow of coal, but the place must be in intake air and not in a crosscut between the main heading and return airway. Two room necks, such as would have to be driven in any event, were used for this sweet-air loop, their ends being connected with a crosscut that would have to be made as soon as the rooms were extended. These loops did not need to be driven of full height; so no rock would have to be handled. A locomotive could push the cars around the loop to the loading point without leaving the high heading and then could pull out the cars at the far end, much as one threads a needle, the empty cars being turned on a wye before placement.

And that is just what is being done. Each loop is made as the heading is advanced and as part of the regular program. It is made with conveyors



How Clearfield Bituminous Coal Corporation Provides for Continuous Loading of Coal by Loop on Side of Main Heading

just like any room neck, and the coal is carried back by the gathering conveyor just as any other coal. The loop is ready for immediate use just as soon as a move forward is made.

To provide a roadway with its center line 8½ or more feet from the rib on the gob side of the heading, dependent on the space the rock to be gobbed requires, and 6½ ft. from the conveyor side of the heading, props are set firmly at such distances that the roof or floor will break at a width of 10 ft. On the bank thus formed on one side of the heading, the rock or clay is gobbed by hand or machine, and on the other bank, between the row of posts and the coal rib, is laid the conveyor by which the coal is carried to the cars at the loop loading point. Sometimes there is a binder and bottom coal, as shown in the illustration, but at other points the binder disappears. Where it is found, the pioneer heading before brushing is driven forward in the upper coal only, and the gob and conveyor are laid on the binder, which binder and coal on the conveyor side are removed as soon as the conveyor is advanced.

A cross conveyor has been laid in the crosscut at the end of the previous advance. It receives coal from another conveyor laid in the back heading, which is driven in the coal exclusively and is about 15 ft. wide. The cross conveyor delivers the coal at the haulage heading into the main conveyor, which has been described already. The coal from the main and back heading, thus combined, is carried to the mine cars by a long gooseneck flight-conveyor elevator. The cars emerge from the low rooms and enter a heading which normally is 5 ft. 6 in. high from floor to roof, but which has been made 6 ft. 2 in. high at the loading point. This affords 18 in. of clearance above the discharge of the elevator, for the rails are laid on steel ties. The elevator is 18 ft. 8 in. long.

The crosscuts made during any given 300-ft. advance could be shut off with permanent stoppings as soon as one crosscut ahead is provided. That, however, is not customary. Canvas usually is provided, and permanent stoppings are inserted only when another further advance is in process of being made.

It would be impossible to close completely the crosscut in which the conveyor is running, but such closure is far from desirable, because the motor drive of the back-heading conveyor should be kept in fresh air and not in the more gas-laden air from the working face. Consequently, a sort of cubicle is arranged at the end of the crosscut with sides of brattice cloth nailed to posts. This boxes in the motor drive, but allows a certain quantity of intake air to flow into the return, and the rest to go to the face of the heading and return behind a line brattice. Of course, the air travels from this crosscut inbye only until the next crosscut is made. Thereafter, all the ventilation of the face of the back heading comes from that and successive crosscuts, and is provided in the usual manner with line brattices tied in with the crosscut. All conveyors here and throughout the mines are of the chain-flight conveyor type.

Concurrently with the use of conveyors in the driving of entries progress has been made in their use for room loading, as the figures of coal tonnage thus loaded clearly show. In fact, at Commodore, there are in all fifteen main-line conveyors and fourteen auxiliary and two Goodman entry loaders; at Clymer, twelve main-line conveyors and thirteen auxiliary, with four Goodman entry loaders; at Rossiter No. 1, eleven main-line conveyors and fifteen auxiliary, with one main-line unit at Rossiter No. 3 and one auxiliary. All the conveyor units are 15 in. wide, whether used at face, in entry or in room. Room and entry conveyors have 15-hp. motors.

Ordinary room-and-pillar methods are favored, though there has been no lack of trial of rival methods. The rooms are from 20 to 30 ft. wide, dependent on the roof conditions. They are driven, accordingly, at from 40- to 60-ft. centers. Usually these rooms are all driven in one direction, though the seam is so flat that it is possible to drive both from the back heading and the main, wherever gassy conditions do

not make that inexpedient. Driving in two directions disturbs ventilation and too often results in incomplete extraction. As a rule, rooms are now made 300 ft. long.

With conveyors, it is no longer desirable to restrict the length of rooms. In fact, the lengths have been increased, thus reducing the number of headings and consequently avoiding rockwork. With development made rapid by the use of conveyors, the need for driving rooms both right and left from a center entry becomes less urgent than before, and the practice probably will be discontinued. However, increasing depth puts a greater burden on the pillars and increases the quantity of gas, both factors ruling out, in any event, what the British term "double-wicket" entries.

Face conveyors are from 12 to 20 ft. long, dependent on room width, and raised at one end about 8 in. to pass the coal from the face over the side of the room conveyor, by which the coal is taken to the heading or gathering conveyor, which usually receives the coal from three room conveyors. Where rooms are driven on the back-heading side of the entry, they are started from the main heading, and thus neither a second gathering conveyor is needed nor a crosscut conveyor to bring the coal to the conveyor in the main heading. So all the conveyor work is quite simple. Pillars are drawn by the same system, the face conveyor being set at the end of the pillar where it loads into the room conveyor.

By standardized systems of timbering, the miners are protected against roof falls. Safety posts are set at 10 ft. intervals as soon as the floor under the first foot of the roof exposed by shooting down the coal over a new cut has been cleared by shoveling. The coal is removed at these points before it is touched elsewhere, effort being made to place these posts before any coal, but that in the way of placing them has been shoveled. The posts may be set in the space thus cleared or just along the line of the original face.

It is recognized that the roof over the coal newly shot has been jarred by explosives, has not been examined nor been given due time to develop evidence of its intrinsic danger, and certainly not given the time that may be necessary for it to fall. It is fraught, therefore, with unknown possibilities of mischief, and a safety post at the edge of the area will help to minimize the danger.

But it is always borne in mind by the management that a safety post driven hard into place may crush roof coal or weak shale and may even penetrate it, with the result that when the support is removed the roof may fall and kill or injure someone. Where the roof is of that spongy treacherous nature, screw-type safety posts are used, holding 6-in. channel bars against the roof. These distribute the support, not only giving increased protection over the area they cover and the surrounding areas, but also preventing the strength of the roof from being weakened or destroyed. This practice, however, as also the condition that gives rise to it, is exceptional and is used only with tender roof.

Conveyors have the advantage that they can be laid so near the face that the area unprovided with effective support is at a minimum. Permanent timber can be, and is, set only 2½ ft. from the face of the working as measured before the shooting of the coal. Shaker conveyors have been used since 1925 and have given much satisfaction. Equipped with Duckbills, these conveyors are used largely in the driving of narrow places. Four such units are in operation.

As much rock as possible is gobbed inside the mine. All of it is derived from the driving of roadways. Some is stowed by hand, some with Myers-Whaley machines and some with Goodman scrapers, using a scoop reinforced with manganese steel and moving about 1,500 lb. per trip.

Two track-mounted coal cutters are in use, one a Goodman top cutter and the other a Goodman bottom cutter, but in general shortwall machines prevail. Shortwalls are used in driving headings. Formerly, during the advance of these places, a track was put in the headings, in the last crosscut of the previous advance and in the back heading, to make it possible to shift the shortwall machine from face to face. Now, however, each heading face has its own shortwall, with great savings in tracklaying cost and machine-transportation costs, and with increased flexibility.

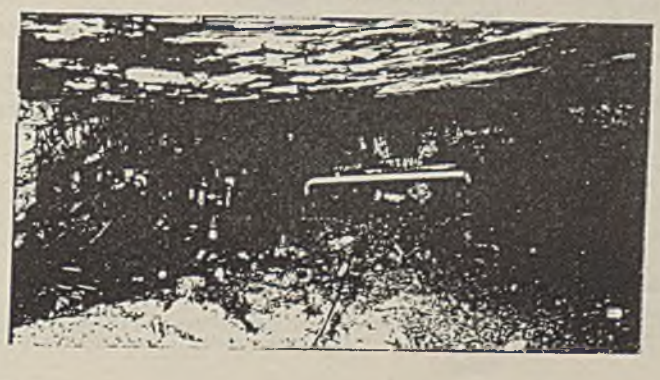
Accident frequency and severity rates at the mines of the Clearfield Bituminous Coal Corporation have been decreasing as mechanization has proceeded. The introduction of loading equipment, though it has hazards of its own, removes certain hazards which the placement of cars in rooms and the removal of cars from rooms involve; the use of a trip that is not uncoupled near the face removes the hazards incident to coupling at such places; the introduction of conveyors keeps the lane in front of the face as narrow as, or narrower than, in hand loading and narrows the lane along the rib, thus decreasing the unsupported area at the intersection of these two lanes—a danger wherever cars are loaded, whether by hand or mechanical means. Men are not crushed by cars in the room nor run over by them; props are not knocked out by runaways as they often are by cars; fingers are not nipped off in pushing cars, but accidents of a sort happen, more often per 1,000 men employed at these mines with mechanical loading than with hand loading; but it will be noted that the severity rates with hand labor have in two years out of three been much higher than with mechanical loading, showing that the accidents to loading mechanization employees were mainly of the lighter order.

The figures given are for all lost-time accidents—accidents, that is, which caused a man to lose a day. They are for all mines of the company and, what is more, apply only to "miners and others working at the face."

Accident Frequency and Severity Rates
Clearfield Bituminous Coal Corporation

	Frequency		Severity	
	Hand Labor	Mechanical Loading	Hand Labor	Mechanical Loading
Year	Per million man hours		Days of disability per 1,000 man-hours worked	
1930...	144.5	254.6	26.07	9.37
1931...	76.1	98.1	2.02	3.33
1932...	47.5	82.9	20.44	5.18
	Accidents Per Million Tons		Days of Disability on thousand tons	
1930...	171.2	213.7	30.88	7.87
1931...	95.9	81.6	2.55	2.77
1932...	60.5	74.7	26.02	4.67

That the introduction of mechanical methods of operation has been justified is shown by the fact that when corrections have been made for wage revisions since 1924 the payroll cost per ton in 1932 was 26 per cent less than in 1924.



+ TEN-YEAR RECORD

At Union Pacific Proves Mechanical Loading Pays

By EUGENE McAULIFFE
President, Union Pacific Coal Co.

"Does mechanical loading pay?" The Union Pacific Coal Co., whose progress in mechanization has been described from time to time in these pages, ought to know. Speaking from a ten-years' experience, President McAuliffe answers decidedly "Yes!" And submits the records to prove it. These records show an increase in the percentage of coal loaded mechanically from less than 4 per cent in 1923 to over 80 per cent last year. During that period, payroll costs (exclusive of wage reductions) have declined 35 per cent. Total production costs (again exclusive of wage reductions) have dropped 26 per cent.

THE TECHNIQUE of loading coal with machines as a substitute for shoveling by hand is rather well understood. Nearly every phase of the process, as well as the different types of machines used, has been made the subject of numerous technical papers, presented through the various mining associations and the mining press. A steady improvement in methods is yet being carried on, and it would be idle to say that the inventive genius of the manufacturers of coal-loading machinery has reached the end. The undercutting of coal with machines, air and electrically driven, is more than a half century old and yet improvements are being constantly made in coal-cutting machinery. The question that concerns the average manager today is, "Does the loading of coal by machinery pay?"

The Union Pacific Coal Co., with mines located in Wyoming, works in coal ranging in thickness from 4 to 26 ft. and pitching between 4 and 17 deg. Its ten years of coal-loading experience, presented in concise form, may help mine managers to arrive at a conclusion as to the profitableness of the loading of coal by machinery. The records of the Union Pacific Coal Co. covering the mechanical loading of coal were established in 1923, when 3.32 per cent of the total tonnage was loaded with machines, the percentage growing gradually until in 1932 81.13 per cent was so loaded. Complete mechanical loading has not been attained because of:

(*a*) The necessity for the removal of scattered pillars left in former hand-loading territory. (*b*) The approach to exhaustion at certain mines, which did not justify the required investment in loading machinery, transformers, power lines, etc. (*c*) The desire to retain a number of old employees who, it was thought, could not readily adapt themselves to the newer methods. It has since been learned that all employees can be absorbed in a mechanization program.

The tabulation shown covers the progress made and the results attained in a 10-year period. No interest on capital investment is shown, payment for machinery being made when purchased; such a charge, however, if set up, would be less than 2c. per ton loaded mechanically. Coal loaded in the 10-year period totaled 27,752,995 tons, of which 10,701,075 tons, or 38.55 per cent, was loaded with machines. The last of the mines loading by hand will close in 1934.

With the knowledge that mining costs vary not only as between mines owned and operated by the same company with-

Results and Costs of Mechanization

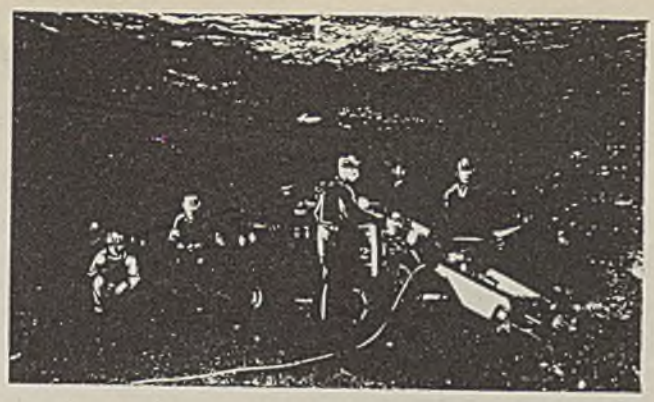
	1923	1924	1925	1926
1. Total number of employees*	3,034	2,770	2,486	2,241
2. Percentage, using year 1923 as 100.0	100.0	91.3	81.9	73.9
3. Aggregate decrease in number of men	—	264	548	793
4. Change in force of men from previous year	—	—264	—284	—245
5. Total coal loaded, tons	3,241,104.85	2,821,677.80	2,779,064.54	2,776,245.45
6. Total tons loaded mechanically	107,693.00	161,245.00	265,432.00	601,611.15
7. Percentage of mechanically loaded coal	3.32	5.72	9.55	21.67
8. Cumulative capital expenditure for mechanical loading machines	$ 41,705.23	$ 53,236.32	$ 89,372.25	$ 206,128.70
9. Present value mechanical loading machines — depreciated value	$ 23,349.77	$ 28,434.68	$ 34,026.19	$ 144,742.48
10. Yearly purchase of new loading machines	$ 11,427.22	$ 11,531.09	$ 36,135.93	$ 116,756.45
11. Investment, present value per ton of mechanically loaded coal after depreciation (9÷6)	$ .217	$ .176	$ .128	$ .241
12. Total payroll cost, using that of year 1923 as 100	100.0	88.9	83.6	80.3
13. Total cost per ton, using that of year 1923 as 100	100.0	93.7	86.7	84.5
14. Line 12 based on 1923 wage scale				
15. Line 13 based on 1923 wage scale				

*Exclusive of general office; items 13 and 15 include all labor, material, power, depreciation, depletion and royalty. Costs for 1928 increased $0.13 per ton to equalize

in the same district, and between districts, the reductions in "labor" and "total mine cost" are shown in percentages of the costs governing when the program was put under way in 1923. This method will enable those interested to apply the results shown to their own properties more readily than if savings in cents per ton were shown. In order that the loading process will not show credit for reductions in cost properly chargeable to wage-scale adjustments, lines 14 and 15 have been added. These two lines show the ratio between "labor" and "total mine cost" that would apply, 1929 to 1932, inclusive, if no reductions in wage rates had been made Dec. 1, 1928, and July 1, 1932.

Factors difficult of measurement invariably enter into a comparison of the character set forth above, certain of these tending toward reductions in costs, others again leading toward increases. In no instance have men been dismissed to make way for loading machines, but the heavy labor turnover previous to 1929, due to voluntary resignations, made it easily possible to decide between new men and machines. It will be noted that the force decreased 1,189 men between 1923 and 1929; thereafter it fell off less rapidly, reductions now being largely confined to old age, sickness and pensioning. The man power and mines of the company are growing older, no new mines being put into production since 1923 and the company carrying many men with from 20 to 50 years of service.

As the major production of the company is consumed by the owner railroad, the output has fallen from 3,241,105 tons in 1923 to 2,045,270 tons in 1932, a reduction of 36.9 per cent. If the 1923 tonnage had been maintained, the reduction in cost ratio would have been much greater; the ratio shown by line 15 for 1932 would have approximated 60 per cent instead of 73.8 per cent, and when general expenses, including taxes, are added to mine cost, an even better comparison is shown. That the loading-machine investment is being properly depreciated is well shown by the continuous reductions in "depreciated value" shown by line 9 of the tabulation. Certain machines have been set aside as obsolete, a condition to be faced in all mechanical enterprises.



Six types of loading machines are employed, the machines in condition for service on Jan. 1, 1933, being as follows:

Shaker conveyors with duckbills	91
Joy 4 BU and 5 BU type	12
Large-capacity scrapers	7
Pit-car loaders	41
Button conveyor (made locally)	1
Butler compressed-air rock shovels	2
Total units	154

The question of the relative safety of mine employees, mechanical versus hand loading, is a question meriting consideration. Many factors enter into mine safety, but as this is primarily a cost comparison, the question of safety may rest with the statement that workmen's compensation, in the face of rising rates of award, was in 1932 33 per cent below the 1923 cost per ton mined.

Certain definite advantages have followed our loading program which are difficult to evaluate. We have found that in our "bad roof" district, where rooms 22 ft. wide must be cross-barred and closely posted, the rate of extraction by machine enables the management not only to mine out all rooms without loss but in addition draw the pillars back equally clean.

Again, all our coal seams pitch under the mountainside, with the result that "cover" increases rapidly. When 1,200 ft. of cover is reached, danger from bumps develops, increasing as the cover thickens. With the capacity to drive unlimited development work in a short time, advance work has been carried to the boundary or the maximum depth considered practicable, the pillars taken out on retreat, relieving the working area of excess weight. This has resulted in an increased recovery of coal reserves.

The cost of ventilation, including power for fans, maintaining stoppings, etc., also has been materially reduced because of the lesser area required to produce a given daily tonnage, this concentration of area being largely responsible for the improvement in total costs shown, as well as in safety.

Though the Union Pacific Coal Co. does not sell commercial coal, nearly every neighboring company in the southern Wyoming field has enjoyed an experience closely paralleling that of the Union Pacific Coal Co. As a matter of fact, mechanical loading has effected savings that alone have made it possible for the commercial mines to compete with coal mined under lower wage scales, as well as with natural gas and oil fuel.

A bonus system based upon a fair day's production enabled a large proportion of the men employed in 1932 to increase their daily wage $0.729 on one class of loader, and $0.842 on another type of machine. No penalty is attached to failure to attain the output on which the premium is based. If the results outlined prove helpful to operators who are trying to find the way out, the preparation of the article will be justified.

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at Mines of Union Pacific Coal Co.

1927	1928	1929	1930	1931	1932
1,915	1,838	1,845	1,893	1,815	1,719
63.2	60.7	60.8	62.4	59.8	56.6
1,119	1,196	1,189	1,141	1,219	1,315
—326	—77	+7	+48	—78	—96
2,750,430.20	2,927,390.00	3,060,632.25	2,897,653.25	2,453,527.24	2,045,270.00
1,107,775.85	1,501,578.00	1,774,279.65	1,721,659.70	1,800,651.96	1,659,148.81
40.28	51.29	57.97	59.42	73.39	81.13
$ 255,684.56	$ 363,522.64	$ 437,125.60	$ 471,599.12	$ 538,532.65	$ 573,285.47
$ 217,410.69	$ 259,232.97	$ 245,392.61	$ 220,166.59	$ 230,666.07	$ 214,477.33
$ 49,555.86	$ 107,838.08	$ 73,602.96	$ 34,473.52	$ 66,933.53	$ 39,752.82
$ .196	$ .173	$ .138	$ .127	$ .128	$ .129
71.9	70.2	62.2	60.8	57.8	51.4
77.3	76.3	69.8	69.1	68.4	68.3
		70.5	69.2	66.2	64.8
		76.5	75.9	75.1	73.8

wage reduction of Dec. 1, 1928. Reduction in wages: all labor, 16.2c. per ton, effective Dec. 1, 1928. Reduction in wages; all labor, 20.3c. per ton, effective July 1, 1932.

The Road to Stabilization

IN A TELEGRAM to President Roosevelt, R. C. Holmes, president of the Texas Co., made a plea for abolishment of the "lawless" element in oil production. He pointed out that the oil industry has during the past few years, "through selfishness, lack of proper organization and cooperation, practically ruined the coal industry, notwithstanding the fact that every oil-producing state, except two, is directly interested in the coal industry."

● The decline in the consumption of coal, due to more efficient use, substitute fuels, hydraulic power, and later the general depression, has developed among producers tactics similar to those described in the oil industry by Mr. Holmes. Destructive merchandising is an old story. The industry in its efforts to bring back profits has been a "house divided in itself."

● While tremendous strides in bringing about greater operating economies with mechanization, close concentration of work and more systematic coordination of the various cycles of operation have been made, the merchandising methods have become so antiquated that all advances in operations have been more than offset. The problems of merchandising, however, have until recently, been impossible of solution. The only practical ways to overcome the difficulties were blocked by law. Repeated suggestions and attempts at government regulation and control have been constantly opposed on the ground that stabilization should come from within the industry rather than from an outside agency.

● After many attempts to reach an agreement on a constructive program, the regional sales agency plan has been adopted, carried through the courts, proved legal, and is now in its first stages of operation. The legal blockade has been removed and thus the coal industry has assumed a position of leadership among all natural-resources industries in modern merchandising.

● With leadership comes responsibility. The progress of the *Appalachian Coals case* before the Supreme Court has been watched with nation-wide interest by all depressed industries. All industries will watch the infant take its first steps and grow, or falter and fall by the wayside.

● The two elements which seem most necessary to assure success are sanity and faith. Although the path apparently is clear now, the obstacles are many. The cut-throat competition of the past and the desperate efforts on the part of individual companies to survive have resulted in a lack of faith between companies, and within the companies between men and management. All efforts toward trade agreements have been viewed with suspicion, as each company watched for the other to break faith. The operator has reduced wages with the promise of additional working time and better weekly earnings for labor only to find himself and his men in a very short time in the same position as before, as every other operator followed suit to get the additional business. Each now realizes that wage cuts do not sell more coal nor advance the interests and contentment of the workers.

● That there is a more wholesome view taken of the future by the industry is indicated by the recent trend toward the completion of regional sales agencies in northern West Virginia, Ohio, Pennsylvania and Alabama since the validity of the Appalachian agency was sustained in the courts.

● The change in administration has brought hope of business improvement. The coal industry has faith in the ultimate stabilization of the sales agency plan. Few, however, fully understand the sacrifices to be made. In any cooperative effort a spirit of give and take is necessary. No one policy or act on the part of those directing the agency will immediately and directly benefit each and every member. The human element is not infallible and mistakes will be made. A severe tax on the faith and patience of tired and overanxious companies is in store. The real trials are yet before us in the pioneering of this revolutionary plan. The ship, which had been floundering about because land was not in sight, is now headed into the wind.

● The course of general business will have a direct bearing on the degree of improvement to be seen through the operation of the plan. The first two years will be the critical period. If, after the first few disappointments, members lose confidence, a failure having far-reaching depressing effects on all natural resources industries will result. All the criticisms which have been heaped upon the industry and its lack of leadership will be justified.

● If, on the other hand, a spirit of abiding faith, whole-hearted cooperation and interest in the real responsibility is expressed by the membership of the agencies, the subsequent stabilization of prices followed by greater benefits to stockholders and workers is assured. Leadership is coming to the front now and new leaders will be made. The degree of faith and sane thinking will measure the success in both operations and sales.

L. M. Thomas

Chairman, Program Committee
American Mining Congress, Tenth Annual Convention of Practical Coal Mining Men and National Exposition of Coal Mining Equipment

Technical Program, Pittsburgh Convention

American Mining Congress

Monday, May 8—Noon

LUNCHEON—C. J. Ramsburg, Director, American Mining Congress, presiding.
Introducing J. B. Warriner, President, American Mining Congress.
R. L. Ireland, Jr., Chairman, Coal Division.
L. N. Thomas, Chairman, Program Committee.
Ralph C. Becker, Chairman, Manufacturers' Section.

Monday, May 8—2 p.m.

1. *Budget Control of Operation.*
N. A. Emslie, Superintendent of Fairmont Field, Bethlehem Mines Corporation.
George C. McFadden, Assistant Vice-president in Charge of Operations, Peabody Coal Co.
L. W. Householder, Vice-president in Charge of Operations, Rochester & Pittsburgh Coal Co.

2. *What Determines Economic Percentage of Coal Recovery.*
(a) Cost of Timbering.
(b) Roof Control.
By Raymond E. Salvati, Manager, Pond Creek Pocahontas Co.

3. *Possible Results of Standardized Mine Timbers.*
E. B. Agee, Superintendent, Dehue Mines, Youngstown Mines Corporation.

4. *Prevention of Personal Injuries in Mine Operation.*
H. L. Richardson, Vice-president, West Kentucky Coal Co.

Tuesday, May 9—10 a.m.

CHAIRMAN—R. H. Morris, General Manager, Gauley Mountain Coal Co.

1. *Competitive Fuels.*
B. R. Gebhart, Director of Public Relations, Illinois Coal Bureau.

2. *Drying Washed Coals.*
F. A. Jordan, Youngstown Sheet & Tube Co.
Ormal Higgins, Metallurgist, Humphreys Coal & Coke Co.
Thomas Garwood, Engineer, Chicago, Wilmington & Franklin Coal Co.
J. B. Morrow, Preparation Manager, Pittsburgh Coal Co.

3. *New Things in Coal Mining.*
(a) The Coal Saw.
C. D. McLaughlin, Superintendent, Pioneer Coal Co.
(b) Machine Bits.
James Hyslop, Assistant Superintendent, Dresser Mine, Walter Bledsoe & Co.
(c) Automatic Air Valve.
Thomas W. Gray, Superintendent of Mechanical Equipment, Pittsburgh Coal Co.

4. *Lubricating Costs.*
W. J. Jenkins, President and General Manager, Consolidated Coal Co. of St. Louis.

Tuesday, May 9—2 p.m.

1. *New Things in Coal Mining.*
(a) Blasting.
C. J. Sandoe, Vice-president, West Virginia Coal Co. of Missouri.
(b) Energy Air Miner.
H. H. Taylor, Jr., Vice-president, Franklin County Coal Co., Inc.

2. *Importance of Analysis of Screen Sizes.*
Carl Scholz, Consulting Engineer, Charleston W, Va.

3. *New Things in the Coal-Cleaning World.*
J. B. Morrow, Preparation Manager, Pittsburgh Coal Co.

4. *Main-Line Haulage.*
L. E. Grant, Superintendent, Chesapeake & Ohio Railway Co.

5. *Does Minus 48-mesh Coal in Byproduct Ovens Affect Quality of Coke?*
H. W. Seyler, Chief Chemist, Byproduct Coke Works, Carnegie Steel Co.

Wednesday, May 10—10 a.m.

CHAIRMAN—W. J. German, General Superintendent, Pocahontas Fuel Co.

1. *Modern Mine-Car Designs.*
J. S. Miller, Director of Research, Lehigh Navigation Coal Co.
W. J. Borries, General Manager, Dawson Daylight Coal Co.

2. *Power-Saving Devices.*
E. R. Price, Superintendent, Inland Steel Co.

3. *Driving Rock Tunnel With Mechanical Loader.*
O. G. Sharrer, Superintendent, Union Pacific Coal Co.

4. *Developments in Explosives and Their Use in Coal Mines.*
C. Stewart Comeaux, Secretary, Institute of Makers of Explosives.

5. *Necessity for Discipline in Anthracite Mines.*
James H. Pierce, Consulting Engineer, Scranton, Pa.

6. *Gathering in Relation to Mine Haulage.*
D. W. Jones, General Superintendent, Valier Coal Co.

Wednesday, May 10—2 p.m.

CHAIRMAN—John C. Haddock, President, Haddock Mining Co.

1. *Safety Dividends.*
Thomas Lightfoot, Engineer, Accident Prevention and Compensation, Koppers Coal Co.

2. *Housing Problems.*
Morris Coulter, Chief Engineer, Clearfield Bituminous Coal Corporation.
F. B. Dunbar, General Superintendent, Mather Collieries.

3. *Coal Preparation and Washing in West Central District.*
C. Y. Thomas, Mechanical Engineer, Pittsburg & Midway Coal Mining Co.

4. *Maintenance of Mining Machinery and Other Underground Equipment.*
E. J. Newbaker, Vice-president, Berwind-White Coal Mining Co.
Jerome C. White, Production Engineer, Pittsburgh Coal Co.

5. *Developments in Mechanical Loading.*
E. J. Christy, Mine Superintendent, Wheeling Township Coal Mining Co.

Thursday, May 11—10 a.m.

CHAIRMAN—P. C. Thomas, Vice-president, Koppers Coal Co.

1. *Plans for Surplus Miners.*
Clarence E. Pickett, Executive Secretary, American Friends Service.
George C. McFadden, Peabody Co.
Paul Weir, Vice-president, Bell & Zoller Coal & Mining Co.
George H. Rupp, Manager, Mining Department, Colorado Fuel & Iron Co.

2. *Successful Accident Prevention.*
A. L. Hunt, General Superintendent, Pennsylvania Coal & Coke Corporation.

3. *Has Mechanized Mining Brought Safer Coal Mining?*
Lyman Fearn, State Coal Mine Inspector, Rock Springs, Wyo.

4. *Utilization and Research for Coal.*
Dr. A. W. Gauger, Director of Mineral Industries Research, Pennsylvania State College.

5. *The Mining of Smokeless Coal in the Southwest.*
E. M. Douthat, Manager, Majestic Coal Mining Co.

Thursday, May 11—2 p.m.

1. *Purchased vs. Generated Power.*
Peter F. Loftus, Consulting Engineer, Pittsburgh, Pa.
W. J. Borries, Dawson Daylight Co.
W. P. Vance, General Superintendent, Butler Consolidated Coal Co.
P. C. Graney, General Manager, C. C. B. Smokeless Coal Co.
G. F. Osler, President and General Manager, Chartiers Creek Coal Co.

2. *Generation and Utilization of Power as Applied to Anthracite Mining.*
Paul Sterling, Mechanical Engineer, Lehigh Valley Coal Co.
Edgar Schweitzer, Fuel Engineer, Lehigh Valley Coal Co.

3. *Use of Shaking Conveyors in Anthracite Field.*
Jerome McCrystle, Chief Engineer, Wyoming Valley Collieries Co.

4. *Mine-Fan Economy.*
J. E. Jones, Safety Engineer, Old Ben Coal Corporation.

+ FIVE YEARS' WORK

Proves Value of Conveyors at Chauncey Colliery

Successful mechanical mining of thin-seam anthracite owes much to pioneering work with shaker conveyors. No small part of this pioneering has taken place at the Chauncey colliery of the George F. Lee Coal Co. As a result of the progress, reported in past years in these pages, that company now mines 60 per cent of its output with conveyors and has raised the average production per man for all employees from 1.60 to 2.47 gross tons per day.

A PIONEER in the use of shaker conveyors in the anthracite region, the George F. Lee Coal Co., operating the Chauncey colliery, near Plymouth, Pa., has found this equipment to be the most feasible answer to the problem of mining thin beds at a profit. The mine originally was opened in the Red Ash bed, but when that seam approached exhaustion, the Top Ross was entered and worked. About five years ago, however, production from the latter bed was threatened with a rapid decline and only the 30-in. Bottom Ross and Chauncey beds were left as possible means of maintaining output. At that time, only the Bottom Ross was considered, and as conventional methods of mining entailed a prohibitive rock cost, the company turned to conveyors. Notes on the progress of the work, carried out under the direction of Fuller Reynolds, superintendent, have appeared in *Coal Age* as follows: Vol. 32, p. 334; Vol. 35, p. 210; Vol. 36, p. 64; Vol. 37, p. 53.

Although each year a larger percentage of the output has come from the thin seams, the increased use of conveyors has resulted in a steady rise in the output per man employed. In 1927, the average output per man per start, all underground and surface employees, including the office force, was 1.60 tons. In 1932, the average output per man per start was 2.47 tons, considerably above the minimum of 2 tons which seems to have governed the closing of a number of anthracite operations. Development of equipment to meet the standards of lightness and small horsepower set up by the management has gone hand in hand with the increase in tonnage. As a result, practically all of the conveyors are of the Lee type, designed by colliery officials and manufactured by the Ladel Conveyor Co.

The beds at the Chauncey colliery listed in descending order are as follows: Top Ross—roof coal, 6 in.; bone, 12 in.; coal, 51 in.; total thickness, 69 in.; Bottom Ross—coal, 22½ in.; shale, 1½ in.; coal, 6 in.; total thickness, 30 in.; Chauncey—dirty coal, 15 in.; clean coal, 15 in.; total thickness, 30 in.; Red Ash—coal, 11-12 to 15½ ft.; middle rock, 1½ to 5-6 ft.; coal, 8 ft.; total thickness, 25 ft.

One-third of the Top Ross is still virgin, while the Bottom Ross is entirely first mining. The Chauncey bed has been opened only recently. The Red Ash has been mined over entirely, and present work is limited to the recovery of such pillars as remain. In some instances, the full height of the Red Ash coal is still retained, but, in others, the pillars have been crushed down to a thickness of approximately 12 ft.

In March of this year, 37 shaker conveyors were on hand at the Chauncey colliery, of which 35 were Lees. Conveyors in operation totaled 35, distributed among the various beds as follows: Top Ross, 5; Bottom Ross, 23; Chauncey, 5; Red Ash, 2. Average output from all beds was 660 tons per day, of which the conveyors loaded 393 tons. Including four machines operated two shifts per day, conveyor work accounted for an average of 90 man-shifts per day, making the average output per man per shift 4.37 tons.

In accordance with the general practice in the northern anthracite region, the chamber-and-pillar system is used at Chauncey colliery, and the pillars have been columnized. In the Bottom Ross and Chauncey beds, where most of the conveyor work is being done, chambers are driven on 60-ft. centers, 26 ft. wide, to a depth of 270 ft., which experience has shown to be the dimensions that best fit the conditions. This system also is followed in the unmined areas of the Top Ross Bed, though most of the work in this bed consists in recovering pillars by driving skips 6-7 ft. wide up the sides of the blocks. Skipping is employed to a considerable extent also in

the Red Ash, though the cut-up condition of the bed makes a standard system impossible.

The major change in mining methods with conveyors was the adoption of the retreating system in the Bottom Ross and Chauncey beds. Chamber work and pillar extraction in these beds is now deferred until the gangways reach their limit, whereupon everything is removed on the retreat and the section abandoned. Development of the thin beds, however, emphasized the necessity of speeding gangway work to avoid hampering production. As a rule, the required minimum height of gangway is 7 ft. 4 in., of which 30 in. is coal and the remainder rock. Driving by hand was manifestly a slow and costly method, so the company purchased three Northern (Ladel) pit-car loaders for this work, as well as an additional machine for use in coal in the Top Ross.

With some changes to meet the service conditions encountered in handling rock, these machines have been in service since late in 1929, and have handled as high as ten cars of coal and rock per shift. Crews consist of five men, as follows: one miner and one laborer, who drill and shoot, and three muckers. This crew ordinarily handles two places. Through the use of the pit-car loaders, the company has found it possible to maintain its record of advancing gangways 150 per cent faster with only 66 per cent more labor, while at the same time reducing cost per yard from $36 to $20.

Where possible, shaker conveyors are placed so that the gradient favors the flow of coal, though in some cases, usually in the old workings, it is necessary to work against the pitch. This has been done successfully on grades up to 6 per cent. Because very steep pitches occasionally are encountered, the Lee shaker (*Coal Age*, Vol. 37, p. 53), to facilitate handling, is designed with very light trough sections—8 ft. lengths each weighing 80 lb. Changes in direction, when gentle, are accomplished by inserting wood blocks between the fastenings on one side of the conveyor line; where a major change is desired, one or more short angle sections are inserted between trough sections.

A wide range of conveyor mountings have been used since this equipment was adopted. At first, the sections were mounted on metal stands, but later they were suspended from the roof by chains. Difficulty in keeping the chains adjusted caused the company to turn to wooden rollers mounted in brackets. Lately, the conveyors have been allowed to rest on wooden crosspieces nailed to the timbers, and this method has proved satisfactory.

Experience has resulted in the adoption of a working plan based on cleaning up each place every day. A miner and a laborer ordinarily make up a crew, though in a few cases crews are enlarged by the addition of an extra laborer. For the sake of safety, the working cycle is based on shooting at the end of the shift. At the beginning of the shift, the coal is loaded out, after which timbers are set and the conveyor is extended. The face is then drilled and shot; this done, the crew is required to go home, leaving inspection of the face until the next day, when smoke and fumes have cleared away and the men are fresh.

+ NEW EQUIPMENT

Pays for Itself in Year at Island Creek Mines

Three years ago, the Island Creek Coal Co. replaced its shortwall cutters and post-mounted drills with track-mounted slabbing machines and drills. As set forth in *Coal Age* at that time, the decision to change was based upon the expectation that tonnage per cutting machine would be increased from 400 to 700 tons per shift and that the investment would be returned in two years. Despite reduced operating schedules, these expectations have been more than fulfilled. Output per loader is greater, slack production is less, personal injuries have been decreased and related cost items have been favorably influenced.

WHEN the Island Creek Coal Co. started to equip its mines in Logan County, West Virginia, with track-mounted bottom-cutting slabbing machines and track-mounted drilling machines in 1929 (*Coal Age*, Vol. 35, p. 403), it did so because tests with this equipment showed that an attractive return on the investment could be expected, that a materially higher output per machine could be obtained, as compared with the equipment previously used, and that the adoption of the new machines would decrease the output of fine sizes, increase the efficiency of the loader and reduce injuries.

During the years 1929-30, the company purchased 35 Goodman 324AA track-mounted slabbing machines to replace 70 shortwall machines at the seven mines then in operation, as well as 17 Jeffrey 56A double-spindle, track-mounted drilling machines. Including the drills added since that time, there are 30 cutters (which includes one reserve machine at each mine) and 21 drills (including one or two spares at each operation) at the five mines now working. Curtailments in working time to two to four days a week have made it impossible to test the equipment out under the normal conditions prevailing under a full-time operating schedule, but the results so far obtained have exceeded expectations in spite of this handicap.

Introduction of the new equipment was facilitated by excellent mining conditions, including a good top, which requires little timbering and a nearly level seam (the Island Creek) averaging 7 ft. in thickness. A thin parting near the center of the seam breaks free from the coal in large, flat pieces, thus facilitating separation at the face.

One result of the introduction of the new cutters was the abandonment of the

old standard double-tracked room with a width of 28 ft. in favor of a mining system based on driving the rooms narrow with a single track and widening by slabbing. With this system, after the rooms are necked, advancing cuts are made 13 to 14 ft. wide. After every fourth cut each side is slabbed back to widen the rooms to 26 ft. The side slabs are cut alternately—that is, after two face cuts the left side is slabbed, then, after two more cuts, the ride side is slabbed. In loading, two cars coupled together are spotted at the face, the first car being loaded from the face and the rear car from the slab. This system has worked so well that no modifications have been made since adoption.

From the standpoint of performance, the 25 slabbing machines in actual use at the five mines account for a daily output of 23,000 to 24,000 tons, making the average output per machine 920 to 960 tons per shift. Including the reserve machines, the average output per slabber per shift is 770 to 800 tons. This compares with the projected average of 700 tons for the slabbing machines and the actual average of 400 tons for the shortwall machines previously used. At the present time, the total daily output is produced from 840 to 900 places, an average of 28 to 30 places per machine, reserves included. Of the total number of places, one-third represents narrow work and two-thirds wide work, or rooms.

Both the slabbing machines and the drills played a part in the reduction in nut-and-slack production. As the slabbing machine cuts on the bottom, scrapping, with its attendant production of fines, is eliminated. In addition, the faster feed of the cutters results in coarser cuttings. The change in mining methods to permit production from slabs in the rooms also has influenced the output of large coal, due to the fact that the open end available makes possible a reduction in the explosive charge.

From the drilling standpoint, the adoption of the new equipment has decreased slack production through the better placement of the holes close to and parallel with the roof. With the old post-mounted drills it was necessary to start the holes in the harder body of the coal about 2 ft. down from the roof, angling the holes to the top at the back of the cut. Now it is possible to drill the holes and place the charges in an 8-in. streak of soft coal at the top of the seam, which breaks up regardless of the drilling and blasting method used.

On the whole, the use of the slabbers and track-mounted drills has decreased the quantity of nut-and-slack produced per 100 tons of mine-run by 4 to 5 tons, or approximately 15 per cent. In addition, there has been a material improvement in the constitution of the nut-and-slack itself. The nut portion of the fines has been increased 15 per cent, and experience has shown that it is much less likely to disintegrate due to fractures in mining.

Elimination of bottom scrapping by the use of the slabbing machines is credited with the major part of the increase of 2 to 2½ tons in the average output per loader per shift. This increase, 8-10 per cent, arises out of the fact that the time thus utilized can be devoted to loading.

Another scarcely less important result of the adoption of the new cutters and drills is the reduction of personal injuries. Scrapping bottom was a frequent cause of eye injuries, which cutting on the bottom has eliminated. Another important cause of injuries grew out of handling the heavy shortwall machines and drills previously used. Hernias, in particular, were common, and the new equipment has done much to reduce this and other types of injuries resulting from the necessary heavy lifting and straining.

The new equipment also has made a radical change in the type of men employed in cutting and drilling. In the old days, heavy, well-muscled men were the favorites, and even these lasted no more than six years on the average. Now, intelligence and agility are the chief requisites of machine-men, and, due to the lighter nature of the work, they are able to keep on indefinitely. The same applies to drillers, though, in this case, skill is not a necessity, as the operation of the equipment requires no special training or experience.

The use of both the slabbing machines and the track-mounted drills has shown a material reduction in the respective operating costs. Maintenance costs on both types of equipment also is down to a very small fraction of the previous averages. In addition, other cost items have been affected favorably, including compensation, gathering, track and loading, to mention a few of the more important items. Taking into account only those savings easy to evaluate, the cost of the new equipment was recovered in one year, against the two years' operating time originally projected.

Coming Bright Spots

• *The complete story of the Clairton cleaning plant—why it was built and what the results have been—will be told for the first time by H. W. Seyler, chief chemist, Clairton Coke Works, Carnegie Steel Co., in the June issue of Coal Age.*

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• *And, of course, the high spots in the discussions at the Pittsburgh Mining Congress Convention and descriptions of the new machinery exhibited there also will be an important part of the editorial content next month.*

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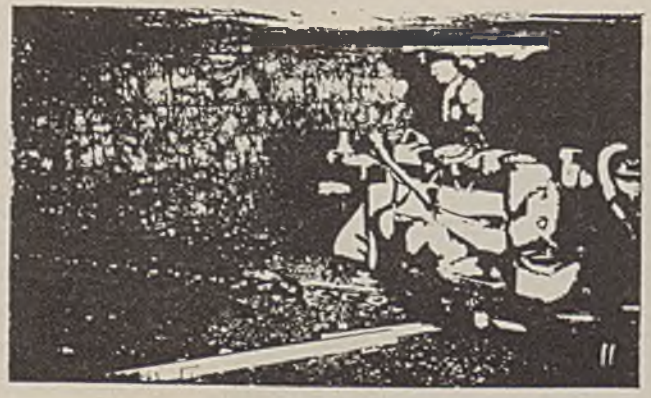
• *How transportation improvements centering around larger cars of special design increased loading efficiency at the Fairpoint No. 9 mine of Hanna Coal Co. is another item on the June bill of fare. P. R. Paulick is the author.*



+ MODERN PREPARATION

Widens Market and Enhances Sales Realizations

By JOSEPH PURSGLOVE, JR.
Engineer, Powhatan Mining Co.

When the Powhatan Mining Co. installed a new cleaning system at its Powhatan mine, in the No. 8 field, less than two years ago, it was confidently anticipated that mechanical preparation and chemical treatment would promote a wider consumer acceptance for the coal. This confidence, according to the author, who follows up his earlier story with a record of current results, was not misplaced, because sales realizations have been enhanced and the market enlarged 50 per cent.

BECAUSE the Southern fields could offer the consumer a coal lower in ash and sulphur and higher in ash-fusion temperature than the run of raw coal in the Pittsburgh No. 8 field in eastern Ohio, the Ohio mines have been at a competitive disadvantage in their natural steam-coal markets. As a result, operators in the Ohio No. 8 section have seen their coals gradually displaced by the product of the Southern mines. Obviously, any way of preparing the Ohio No. 8 coal which would reduce the ash and sulphur content and raise the fusion point would make the Ohio coal a much stronger competitor against Southern coals in the struggle for tonnage.

Modern preparation methods promised a very substantial reduction in ash content with a minimum of reject loss. By cleaning the coal in a Chance cone a large proportion of free pyritic sulphur could be removed, but the coal still contained such a high percentage of sulphur which was not free (organic and pyritic) that the cleaned product, nevertheless, remained a high-sulphur fuel. Preliminary float-and-sink tests indicated that washing at 1.45 specific gravity increased the ash-fusion temperature of the prepared sizes from 2,000 to 2,280 deg. F. The ash-fusion temperature of the slack sizes increased from 1,950 to 2,100 deg. F. From these preliminary tests, it was apparent that the cleaned coal from Powhatan, although low in ash and high in thermal units, would still be a high-sulphur, low-fusion coal when compared with its Southern competitor.

For several months prior to the installation of the Chance washery in September, 1931, raw slack coal had been sprayed with a chemical solution developed by the engineering staff of the North American Coal Corporation. It was found by actual boiler tests made over a period of several months, during which several thousand tons of sprayed slack coal was consumed, that the addition of these chemicals caused Powhatan slack to burn with the general characteristics of a low-sulphur, high-fusion coal.

The preliminary float-and-sink tests coupled with the actual boiler experience on raw chemically-treated slack pointed the way to a combination method of preparing Powhatan coal which would make it a definite rival of Southern high-quality coals.

In September, 1931, a Chance cleaner with a capacity in excess of 400 tons per hour of 6 x ¼-in. coal was installed at the Powhatan mine. This plant was described at length in *Coal Age*, Vol. 37, pp. 193-196. At the same time, a chemical plant was built adjacent to the washery structure. In this plant, machinery was installed to mix and actually control the chemical solution, which is pumped into the washery building where all washed sizes ranging from 6 to ¼ in. are sprayed as they leave the final sizing shaker screens. The ¼x0-in. slack, which is not washed, is thoroughly sprayed before it is mixed with the 1¼ x ¼-in. pea coal from the washery. This method of application insures that each individual piece of coal will be thoroughly saturated with the beneficial solution.

The marketing experience with Powhatan washed and treated coals, of course, is different for each size shipped. The egg sizes, which are used for domestic purposes or for small hand-fired steam plants, meet with favor because of their freedom from free slate

and sulphur bands and because of the low ash and high heat units per ton. The chemicals on the egg sizes, though not so effective as when sprayed on the smaller sizes, prevent the formation of sticky clinkers, eliminate a large quantity of soot in domestic furnaces, prevent tube slagging when used under boilers, and change the color of the smoke to a light tan shade instead of the heavy black color so common when No. 8 coals are burned. Customers have stated the above qualities immeasurable times and have consistently shown a willingness to pay more for Powhatan specially prepared egg sizes.

Marketing experience with the nut size has indeed been a large feather in the cap of the dual preparation. Powhatan nut is being burned generally in furnaces with stokers which cannot, because of design or method of operation, use the cheaper slack sizes. Powhatan washed and treated 1½-in. nut coal is the best quality product shipped from the mine, averaging approximately 6.3 per cent in ash and 13,000 B.t.u. in heating value. The action of the chemicals is pronounced when burning this size, making it possible to operate boilers with temperatures in excess of 2,600 deg. F. in the firebox without objectionable clinker formation. Tube slag is entirely eliminated as well as bad side-wall clinker formation.

In many cases, Powhatan nut has given better boiler performance than low-sulphur, high-fusion nut coals. The mine has been continuously sold out on nut with an over-all realization that compares well with that of egg and lump sizes. Such a statement cannot be made of the realization on nut coal produced and shipped from regular No. 8 district hand-picking tipples.

Marketing eastern Ohio No. 8 raw slack sizes has been a serious problem to Ohio operators for years because of their extremely low ash fusion temperature, very high sulphur content, and low B.t.u. value. The average ash content of Powhatan washed and treated 1½-in. slack is 8 per cent, with its B.t.u. content 13,700. Although the ash-fusion temperature is as low as 2,100 deg. F., thousands of tons of this slack is burned each month under boilers operating at ratings ranging from 200 to 350 per cent without encountering a trace of difficulty due to objectionable clinkering, tube slagging or corrosion.

In test after test, Powhatan slack has evaporated as much water per pound of coal burned as, if not more than, low-ash, low-sulphur, high-fusion Southern coals. Consequent on these tests, Powhatan coal has been, and is still being, used because, due to freight differentials, its delivered price is lower. Thus the steam-plant operator is able to reduce his fuel cost per pound of steam generated. Though the market for slack is badly depressed, the Powhatan mine has been able to find a ready market for this size among consumers who were willing to pay substantially more than the regular market price.

Since September, 1931, this mine has been shipping only washed and chemically treated coals into the commercial markets of Ohio and Michigan. The success of this unique preparation is definitely influenced by two facts: that the market for Powhatan coal has increased 50 per cent, and that the increase is generally due to the displacement of Southern high-freight-rate and high-quality coals.

+ PIT-CAR LOADING

Effects Economies at Superior Coal Co. Mines

One of the first pit-car operations studied by Coal Age editors was the Superior Coal Co. At that time, two mines were using this equipment; today, all Superior operations rely upon it for loading. Greater safety, cleaner coal, lower ventilation costs, more adequate supervision have followed this mechanization.

FOR the past two years, all the coal produced by the Superior Coal Co., of Gillespie, Ill., which is a subsidiary of the Chicago & North Western R. R., has been loaded by pit-car loaders of the standard type. When the mines of the company resumed operations in the autumn of 1932, after the labor suspension beginning April 1 of that year, only three of the four mines previously worked were reopened. At each of these are 4 track-mounted cutting machines, 12 gathering locomotives, 4 main-line locomotives and 108 conveyors, all the last being of the standard type, without turntable attachment. Each is operated by two men, which is all that can work to advantage with such equipment. With pit-car loaders of unusual design, an attempt at one time was made, at a point where speed of extraction was desirable, to employ more men to a loader, but the results were not wholly satisfactory.

In the issue of *Coal Age* of May, 1929, appeared a description of the method of operation, which this article brings up to date. The Superior Coal Co.'s mines are operating in the No. 6 seam, here 7 ft. thick, with the characteristic "blue band," 2 in. thick and 18 in. from the bottom. At this mine a number of "horsebacks," hang from the roof, sometimes coming down within 4½ ft. from the floor.

When the earlier article was written, all the machines were of the shortwall type, but since that time track-mounted equipment has been substituted, one machine of this type serving 27 pit-car loaders. To every nine loaders, one gathering locomotive is assigned, so that a unit consists of one track-mounted cutter, 27 pit-car loaders and 3 gathering locomotives. The mounted cutters each release an average of from 900 to 1,000 tons per day.

F. S. Pfahler, president of the company, says: "Our records continue to furnish proof that the pit-car loading plan is safer and more efficient than loading by hand." One reason is that the men, being paid on a day basis, have no temptation to try to get an earlier delivery of their cars by loading them prematurely when placed, because they realize that even if the cars are loaded early, they cannot go home. In the days of hand loading, they frequently loaded cars as soon as they arrived, even at the expense of leaving up roof, which should have been pulled down or posted, and so exposed themselves to the hazard of being caught by a fall of loosened material.

In fact, the men are more careful to clean their coal now that cleaning is done on company time and now that the men by no possibility can receive pay for the impurities loaded. In mines with hand loading, safety and cleanliness of product often go by the board when the loader desires to get home early. The men, by staying to the end of the shift, also make it possible to provide the locomotives with cars throughout the working day, thus increasing their efficiency. Concentration of operations into a few districts makes marked savings also in ventilation and supervision.

+ COMPRESSED AIR

Plays Part in Mechanization Program at Ehrenfeld

By A. L. HUNT
General Superintendent, Pennsylvania Coal & Coke Corporation

"They never come back" may be true of prize-ring champions, but not with respect to industrial mechanical processes and aids. Witness, for example, the revival of interest in compressed air. Ehrenfeld, as told in *Coal Age* late in 1929, is one of the operations that discovered that compressed air, used efficiently, could play a real part in underground mechanization. Applied initially as an instrument of safety, experience at this mine of the Pennsylvania Coal & Coke Corporation has confirmed the earlier conclusion that the use of compressed air may also be "highly satisfactory from the standpoint of performance."

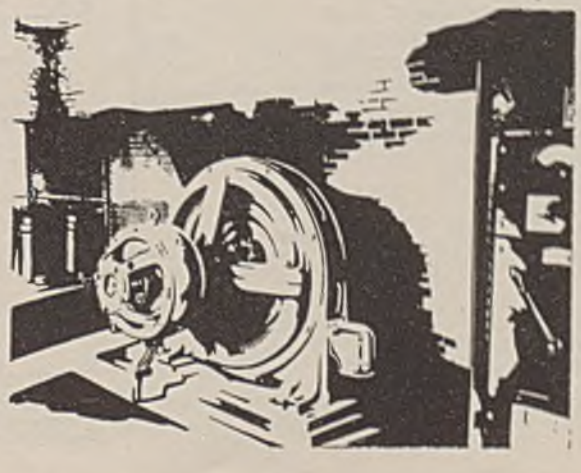
SINCE 1927, the Ehrenfeld mine of the Pennsylvania Coal & Coke Corporation has been using a compressed-air system for the loading of coal. In the issue of *Coal Age* of December, 1929, this installation was described by A. F. Brosky, and the time is ripe to review that installation and note the progress effected. Changes have been few, and the plant is still furnishing satisfactory service. Places have been worked out and the installation has been extended, as reference to the illustration will show, but it is still essentially the same as when first described.

Most of the success must be ascribed to the care in installation. For instance, every effort was made to deliver the air to the lines as cool as practicable. Water for cooling the two Sullivan angle compound compressors was taken from a mountain stream, the waters of which were collected behind an earth dam, but as the water is recirculated, a spray pond is used to cool the water after it leaves the jackets of the compressor. The air is compressed to a maximum of 130 lb. per square inch, the compressors unloading at 110 lb. It was found that these pressures have been reduced at the conveyor drives to only 102, 101, 98, 91 and 90 lb., respectively, the two latter measurements being made at the far end of the line.

The maintenance of such a large percentage of the pressure throughout the system may seem surprising, but the air on leaving the compressors is cooled as much as can be arranged, so that the drop in temperature in the line will be as little as possible. There is, nevertheless, a drop. When the outside temperature is 50 deg. F., the air will leave the compressor at 200 deg. When it emerges from the intercooler and enters the receiver, its temperature has dropped to 168 deg., and in the 6-in. line at the top of the shaft the temperature is found to be only 120 deg. At one of the underground receivers it has fallen to 53 deg., the temperature of the mine atmosphere being 58 deg.

Absence of leakage is perhaps a more important source of efficiency. Instead of the pressure of the air dropping from 90 lb. per square inch at the compressor to 30 lb. in being carried 1½ to 2 miles to the working faces, as was the experience in an installation made 20 years earlier, it will be noted that it now falls only to 90 lb. in the most remote instance, though, of course, the distance is less in the present system; in fact only 6,560 ft. The pipes in the mine are of seamless steel tubing with forged steam companion flanges of the screw-type at intervals of 100 ft. Intervening joints are of the recessed coupling type. The joints are sealed with a mixture of litharge and glycerin and bolted tight, so that leakage is entirely prevented.

Another problem is to avoid the interference of water with the passage of air. The air leaving the compressors passes into after-coolers, each with a capacity



of 1,000 cu. ft. Water leaves the air in these coolers and also in the main air receiver, which is 14 ft. long and of 4½-ft. diameter and is equipped with a Crane tip-tilt water trap. Other water traps are provided at several points underground. The removal of water is aided by the care with which the pipes are laid, set carefully on a gradient and supported on brick or concrete piers, where these are necessary.

Then again, the alignment of the pipes, horizontally as well as vertically, the smoothness of the pipes and the absence of angles and elbows prevent unnecessary turbulence. By supporting the pipes and keeping their surfaces free from mine refuse, deterioration is prevented. From all experience to date, the company has become convinced that most of the objections to compressed air arise from installations made without due care and proper maintenance. By the avoidance of leakage and by the maintenance of pressure throughout the line, the speed of the air is reduced, so that turbulence is greatly lessened.

Supplementing the illustration of the pipe-line layout, it may be said that the compressor plant is located at No. 3 airshaft, which is 456 ft. deep. The air passes down this shaft in a 6-in. line. The combined length of all the pipe lines is 26,470 ft. and the longest continuous line is 6,560 ft.

The system of mining is the same as it was when the article of December, 1929, was written. Rooms are driven in a solid block of coal 340 ft. wide. They are driven in pairs, the rooms in each pair being widened in opposite directions at a point 32 ft. from the heading. They are made 40 ft. wide, and a pillar is left 20 ft. wide between them, but only a 5-ft. pillar is left between pairs of rooms, which pillar is allowed to crush. No more than one pair of rooms is driven at one time, and a second pair is not started till the first pair has had its pillars removed. In this way the roof can expand toward the extracted area, and its tendency to weight the pair of rooms being driven can be avoided. Thus about 96 to 97 per cent of the entire seam is recovered. Both Eickhoff ME 325 shaking conveyors and portable chain flight conveyors are used.

At Ehrenfeld No. 3, as also at other mines of the company, the caving system has had to be used. At some mines in the vicinity, the headings are driven with a wide caving heading in between them, but at Ehrenfeld No. 3 the caving chamber is driven on one side of the return airway with a 30-ft. pillar between the two. The main heading is not driven till later, when the caving chamber has fallen in, and the roof over that heading can expand into the space left by the cave and so relieve pressure. That is why some of the places are marked in the illustration "heading advancing" and some "aircourse and caving chamber advancing." It will be noted that in two places the conveyors are being used in the retreat of heading pillars.

Though only five complete shaking conveyors are needed at any one time, the mine is equipped with six drives, one being carried as a spare. This drive is used to facilitate new set-ups and to allow systematic maintenance without operating delays. The Eickhoff drives weigh 890 lb. and have a maximum stroke of 14¾ in. When extended 350 ft.—the limit set for its extension—a drive of this kind will consume 200 cu. ft. of air per minute when operating in a level working or in one almost level. Roller cradle pans are used with a 70.3-sq.in. cross-sectional trough area, a telescopic trough section being installed at the last pan in each conveyor line, so that the line may be lengthened by its means as each of two face cuts are taken.

Pairs of rooms can be driven up and pillars removed usually in 24 days of working time. About 190 tons daily is produced per conveyor unit per double shift, or nearly 12 tons per man-shift. Eight men usually are assigned to a conveyor; one is stationed at the heading at the end of the shaking conveyor, and the other seven work at the two room faces. Five of the seven work in one room, loading, timbering and doing other work, while the other two cut, drill and shoot the coal. Each room has its own cutting machine and an Ingersoll-Rand Type C rotary coal drill.

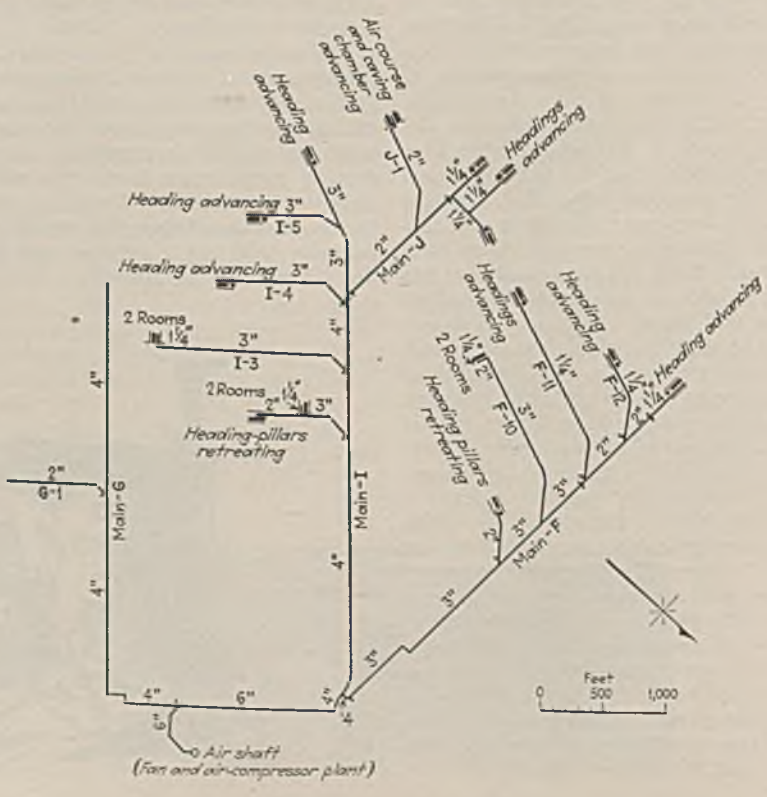
However, in some cases the men prefer to engage in all the work incident to mining—cutting, drilling, loading, timbering and conveyor extension. In that case, there are two crews of three men in each room, and the seventh man goes from room to room, acts as boss and helps in the work.

For removing pillars between rooms, two of these crews are combined and divided into three crews of five men each, the extra man of the sixteen being assigned to the shift needing his service most. In the recovery of heading pillars and stumps the work is double-shifted, and seven men form a crew.

Low maintenance costs for compressor plant and pipe lines have been attained throughout the 5½ years of operation. Maintenance costs on conveyors have been kept low by the use of roller bearings for all movable parts.

From October, 1927, to Dec. 31, 1932, a mechanically loaded output of 1,258,351 net tons has been mined. The year showing the largest production was 1931, when 275,278 tons was thus loaded. The entire tonnage thus mechanically loaded has been produced without a fatal accident or a permanent disability.

Chart Showing Distribution Lines for Compressed Air With Units Which They Serve.



+ TRACK MACHINES

Make High Records at Peabody Coal Operations

By CARL E. LEE
Electrical Engineer, Peabody Coal Co.

The Peabody Coal Co., which has just rounded out its first half century of corporate existence, turned to track-mounted cutting machines at its No. 9 mine in 1929. Since the initial installations, described in these pages early the next year, the company has had no reason to regret its choice of units, which, because each machine can do the work of two to four of the older undercutters, speed up mechanization by relieving mine-traffic congestion.

WITH modern track-mounted cutters as much as 540 lin. ft.. of face can be cut in eight hours at certain mines of the Peabody Coal Co., and 350 to 380 ft. is an average run. On page 87 of the February, 1930, issue of *Coal Age,* an article appeared entitled "Track-Mounted Machine Removes Blue Band in Illinois Mine." That article described the earlier practice of cutting and shooting for Joy loaders. Since that time many more experiments have been made and some further changes made in the cutting, drilling and shooting methods.

Before mechanization, all coal was undercut with shortwall and breast machines at or near the bottom, where the cutting is most difficult, on account of black jack and hard boulders. When the track-mounted machines were installed, it was quite natural to try to cut at the same location. However, the hard cutting continued to be a great handicap to the high production theoretically possible with the track-mounted machines. After many experiments the present practice was adopted, which is somewhat different from that described in the article mentioned.

The practice, at Mines 7, 9 and 58, all in or near Taylorville, is about the same. Mine 7 has two Jeffrey 29C and three Goodman 324AA cutters. Mine 9 has one Jeffrey 29C, three Goodman 324AA, one Oldroyd Type A and one Oldroyd Type B cutter. Mine 58 has four Goodman 324AA cutters.

These machines now cut over the blue band where adjustment will permit, or under if necessary, to a depth of 8 ft. Rooms are cut 30 ft. and entries 12 ft. wide.

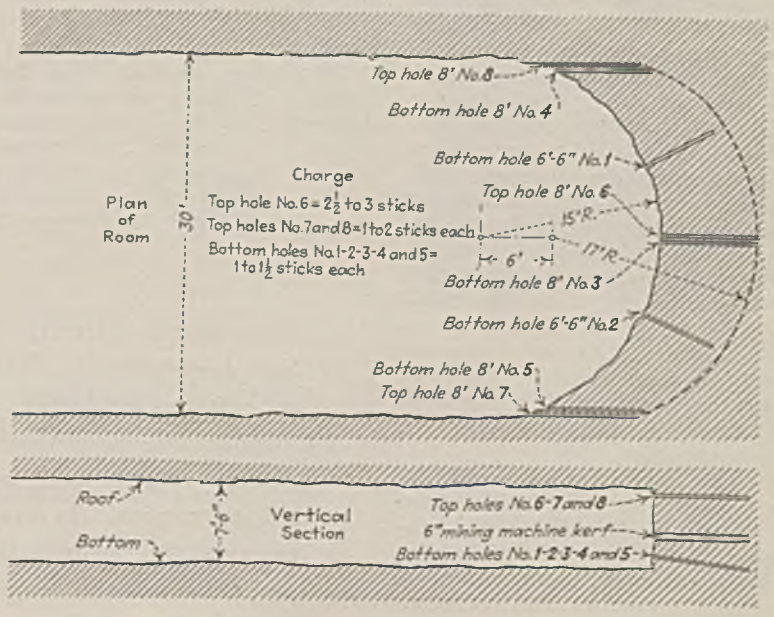
Above the blue band impurities are few, hence the coal is much more easily cut above than at any point below it. About one-third as many bits suffice as would be required for cutting on the bottom. These factors combined enable these machines to cut 18 to 22 places per 8-hour shift, about 8 of which are wide and about 12 narrow. This gives 350 to 380 face feet cut and 2,800 to 3,000 sq.ft. cut per machine shift, producing 725 to 800 tons of coal from a 7-ft. seam. About one-fourth of the mine tonnage is cut on the night shift.

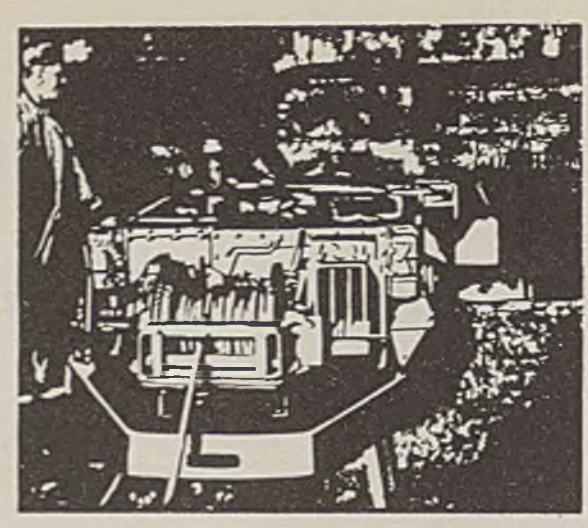
These, of course, are average performances. Under most favorable conditions, one machine will cut as many as 18 wide places or 540 total face feet, or 4,320 sq.ft., producing 1,100 tons.

The Oldroyds cut only in the narrow work of development, so that they cannot be very well compared with the others.

Various experiments have been made on special bits with hard-surfaced points, but their economy has not been proved

Shooting Diagram Showing Position, Charge and Order of Shooting.





for the cutting conditions at these plants. Standard bits sharpened on a Sullivan roller sharpener are used. The Miller oil furnace is used for heating.

The coal is not snubbed, but the cut is cleaned out before shooting. However, inasmuch as the blue band is not cut, it is not disturbed before shooting.

In the drilling of this coal, the up holes give no trouble but the down holes are difficult in two ways. First, the holes may run into impurities which cannot be drilled, so a reset has to be made. Second, the drillheads do not have enough flange to clean the cuttings properly, so there is a tendency to clog and stick the drills.

The location and depth of the holes are shown on the diagrammatic sketch appearing on the preceding page. That illustration also shows the charges of pellet powder used for average blasting conditions and indicates the order of shooting the holes.

The blue band is shot up with the bottom holes and it remains in more or less solid slabs which are removed as much as possible at the face, the remainder being picked out while passing over the picking tables. Extensive additions have been made to the tipple to facilitate the preparation of this mechanically loaded coal.

+ MODERN EQUIPMENT

Keeps Mines Running Despite Wage Differential

Three months after the modernization program, described for *Coal Age* readers in 1931 by Milton H. Fies and W. M. Lacey, had battered production costs at Sipsey, the DeBardeleben Coal Corporation mechanized its Empire mine on the Sipsey plan. Modern rolling stock entered prominently into the picture at both operations. As a result, the company has been able both to cut costs and to maintain higher wage scales than some of its competitors in the same area.

IMPROVED operating methods have proved their value during the depression much as they did during the days of smoother sailing that preceded them, as is shown by the experience of DeBardeleben Coal Corporation, Birmingham, Ala., which made most of its larger expenditures for equipment at its Sipsey mine long prior to the collapse of the stock market. Its methods of operation were described in *Coal Age*, September and October, 1931.

It will be recalled that the corporation replaced its plain-bearing, 1,400-lb. capacity cars with Sanford-Day automatic drop-bottom roller-bearing equipment, 21 in. high, mounted on 14-in. wheels and carrying 2,400 lb., which with wooden boards on the sides would carry 6,200 lb., or, say, 2½ to 3 tons as usually loaded. With this equipment, the daily tonnage was raised from 1,000 to 1,400 tons at a time when long hauls tended slowly to reduce the output and render it uncertain.

After the experience at Sipsey, the same type of cars were purchased for the Empire mine, belonging to the same company. In February, 1931, the mine at Sipsey was closed down on account of business conditions, and operations were concentrated at Empire. The Sipsey mine cars were transferred to the Townley and Coal Valley mines of the same company and, by reason of the increased capacity of the mine cars at Empire, some of its cars were moved to the Hull mine. Consequently, all the DeBardeleben mines now in operation are equipped with Sanford-Day drop-bottom cars.

The savings resulting from the installation at Sipsey, as set out in the earlier articles, have been repeated to a limited extent at the other operations, the cars standing up remarkably well under operating conditions. Repairs are few and not costly. Derailments have been less frequent than in the operation of the mines with the old cars. The officials of DeBardeleben Coal Corporation are impressed beyond doubt as to the value of this type of equipment.

In *Coal Age* of October, 1931, the new method of face operation at Sipsey mine was described. In brief, it was as follows: Triple side entries were driven right and left from the triple entry which serves as the main artery of the mine. These side entries comprised a central heading 10 ft. wide with a low air course on either side, 20 ft. wide, separated from the central heading by 25-ft. pillars. Crosscuts were made in this entry at 75-ft. centers, so staggered

that the distance between a crosscut on the right and one on the left is only 37½ ft.

After the crosscut had been driven far enough to leave a 50-ft. pillar between the aircourse of the main entry of the mine and the first rib of the conveyor section, then to be installed, the outside rib of the aircourse of the side entry was undercut and the cut blown down for a distance of from 150 to 180 ft., depending on the strength of the roof.

A crosscut at the center of this cut was selected as a loading hole and the top brushed for a distance of 15 to 20 ft. to the same height as that of the main heading, the purpose of this brushing being to permit the end of the room conveyor to be elevated enough that the coal could be discharged into a mine car, the seam being only 30 in. thick. Two Jeffrey, No. 49-E conveyors were arranged on each side of a Jeffrey No. 57-E conveyor so as to discharge into the latter, which in the meantime had been laid from the center of the main heading to the outside rib of the aircourse.

Six miners working under a foreman were placed on this 150- to 180-ft. face to load out the coal. A car trimmer at the high heading with the help of a Sullivan hoist spotted the cars, operated the conveyors and trimmed the coal.

On another shift, the face was cut, shot and timbered, and the conveyors were moved forward, so that all the miners had to do was to shovel the coal. Such a miner had an output of 16 tons per day, despite the thinness of the seam, because he had only a few feet to move the coal and had to lift it only about 4 in. and never had to handle it twice, as was only too necessary with hand loading into a mine car.

Three months after the Sipsey mine was equipped with conveying equipment, the Empire operation of the DeBardeleden Coal Corporation was fitted out with the same type of machines, and five sets of conveyors were purchased for use in the Coal Valley mine of the company. Conveyor work at the Sipsey mine gave results which fully justified the expenditures for the necessary equipment, and after the operation was closed down as a result of curtailments made necessary by the present depression, the machines were moved to Empire operation to augment the installation there. The Sipsey conveyors were used in the Empire mine for the sole purpose of driving narrow places in development work. In other words, the system as applied to modified longwall at Sipsey not only paid in that type of work but also proved its adaptability to the efficient and economic driving of narrow places at Empire.

The officials of DeBardeleben Coal Corporation are convinced that had it not been for the installation of the drop-bottom cars and mechanical equipment at both Empire and Sipsey mines, it would have been most difficult to weather successfully the depression.

One fact also should be mentioned: Other competing companies, with mines not so equipped, have reduced their wage scale on similar and competing seams to a point below which this corporation has been able to maintain. It is, therefore, obvious that with an equal wage scale, mines equipped with this type of mechanical loading have a decided advantage in cost of production.

The cost of repairs and maintenance has been reasonable, and the reduction of cost by virtue of the employment of this equipment has made the expenditure a happy one.

+ LITTLE BETTY MINE

Expands Mechanical Loading Operations

About three years ago, the Little Betty mine, in Indiana, began experimenting with a new arcwall-type loading machine. Now it is using five machines of this general type and three pit-car loaders for clean-up. And a fine safety record has been won!

SINCE August, 1930, when a description was published of the operations of the Little Betty Mining Corporation, near Linton, Ind., many changes have been made in the loading equipment of its mine. It then was experimenting with a Jeffrey 44-C loader, from which it was obtaining after its fourteenth shift 188 tons, despite the fact that it was handicapped by the use of cars of a capacity of only 1½ tons, requiring for that tonnage the shifting of 123 cars.

Now, as a result of its success with this general type of equipment, it has three 44-C machines and two 44-CC loaders. The 1½-ton car is still in use. As the coal demanded by the market is largely lump, the face must be lightly shot, and the machine that loads the coal has a difficult job. Three pit-car loaders are being used to pick up small tonnage of loose coal in various places and to prevent delay in moving the larger loading machines.

As before, 5-ton General Electric locomotives are used for gathering and 10-ton locomotives for main haulage. Crosscut roads between rooms are used, as then, for placing cars behind the loaders. The practice is to drive two crosscuts through the rib on each side of the room and provide all four with a switch. As the crosscuts are staggered, the interval between them is at a maximum 75 ft. and at a minimum 50 ft. This provision and the use of 5-ton gathering locomotives aid in cutting down the shifting time, with 40 seconds as a minimum and 56.5 seconds as an average during an actual test.

Introduction of Jeffrey 29-C arcwall cutting machines has made a big improvement in the size of coal obtained and also has increased the quantity of coal cut. This machine will release from 500 to 600 tons per 8-hour shift in the 6-ft. thick No. 4 seam, in which the Little Betty Deep Shaft operates. Rooms are driven 200 ft. long at 36-ft. centers and 26 ft. wide. The arcwall machine cuts in the same semicircle in which the loading machine works; hence all the coal made by the former is picked up by the latter without difficulty. Thus there is little clean-up work to be done. There are now no inaccessible corners to make trouble for the loading crew.

With the exception of the coal that is hand-loaded by pit-car conveyors, all the coal is full-mechanically loaded, and for the period between August, 1930, and March 22, 1933, when the information was gathered, only two men were

injured and only one man lost time thereby, and he was laid up for only 23 days. There were no fatalities. Yet the roof conditions are only moderately good; usually, in rooms, three rows of posts must be set on each side of track. The pleasant relationships between the men and the management may have something to do with this excellent record.

+ TIMBER TREATMENT

Promotes Operating Economies at Carbon Fuel Co.

Timber treatment at the mines, as L. N. Thomas made clear in an article on the subject in June, 1930, raises questions not only of processes but also whether, with intermittent operation, it is economical for a mine to build such a plant. Weighing all the factors, the Carbon Fuel Co. built the plant then described. During the first five months of operation, over 381,000 b.ft. was treated at a cost, exclusive of depreciation, of 1.01c. per board foot. The present story brings this record down to date.

REALIZING the cost of repeated replacement of timber in and around the mines and its direful effect on coal costs, the Carbon Fuel Co., Carbon, W. Va., about four years ago decided to make provision for the treatment of its permanent timber by the use of Wolman salts. This plant was described by L. N. Thomas, vice-president of the company, in *Coal Age* in the issue of June, 1930.

About that time the company had decided to reopen and recondition a mine which had not been operated for four years. The track in the mine was about 15,000 ft. long, and though new ties had been placed throughout the mine a short while before it was closed, almost every tie had decayed—mute, but nevertheless impressive, evidence of what the cost of maintenance of the track that replaced it would be if the ties were not given a preservative treatment.

Nevertheless, only too many companies faced with the same conditions replace, and again replace, ties without giving a thought to the possibility of giving a long life to what is called euphemistically "permanent timber," because they would like it to be permanent, though they know, only too well, that it cannot and will not endure.

The Carbon Fuel Co. decided, therefore, to use permanent timber that would be almost as lasting as its name would imply and provided a 54-in. retort, 21 ft. long, a mixing tank of 1,500-gal. capacity, a storage tank twice as large, a 400-gal. measuring tank, an air compressor, an air receiver and a small boiler. Barrels of Wolman salts, each containing 225 lb., are emptied into the water in the mixing tank, into the bottom of which jets of hot water or steam at high pressure are forced, which cause the salts to dissolve. Timber loaded on small cars are run on a track into the retort, and the end gate is closed and securely bolted.

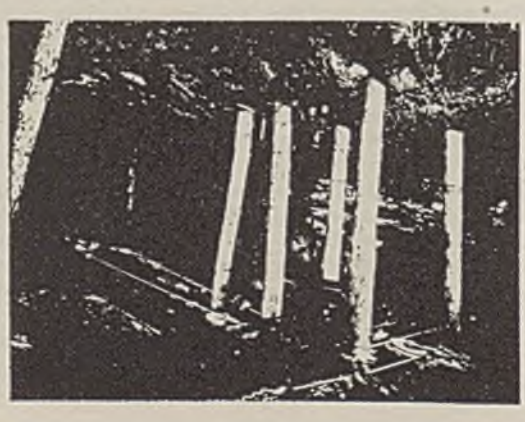
Green lumber, if it is to be treated, is first seasoned in the retort with steam at low pressure. Steam coils raise the temperature of the interior to 150 deg. F. After this process has been continued for a sufficient time, the pressure is reduced till a vacuum of 25 in. is obtained. This process is repeated two or three times, valves being opened at the conclusion of each steaming period to allow the sap and condensed steam to drain off.

While the vacuum of the last cycle is still available, a valve is opened to pull the solution into the retort, and, when it is filled, to draw another charge into the measuring tank. Again pressure is applied, this time of 175 lb. per square inch, and this pressure is maintained until a predetermined quantity of solution has been absorbed by the wood. The pressure on the retort forces the unabsorbed solution into the storage tank, where a steam coil keeps the liquid at about 100 to 120 deg. F.

Seasoned timber need not be steamed. A vacuum for 30 minutes opens up the cells in the wood and prepares it for impregnation. Seasoned timber can be treated in one-third to one-fourth of the time needed for the treatment of green timber.

In the table will be found a statement of the number of ties, posts and other timber treated, the cubic feet and board feet involved, the cost of the labor and of the salts in aggregate and per cubic foot treated, and the total cost per cubic foot of wood. The quantity of Wolman salts used varies with different kinds of wood and the varied duration of natural seasoning. An effort is made to use from $\frac{1}{3}$ to $\frac{1}{4}$ lb. per cubic foot, and the solution is given a strength based on the assumed quantity of the solution penetrating the wood. But the wood may absorb the solution more readily than was expected, and the quantity of salts absorbed in that case will be larger than is regarded as necessary.

Thus far, practically none of the treated timber has been sold to neighboring operations. Most of it has been used for mine ties and posts, but a little over 23,000 cu. ft. of other timber has been treated, as will be noted in the table. This timber is mainly clapboards



for mine posts, timber for the foundation of houses and other buildings, porch floor boards, bridge timbers and bridge foundations.

Since the treatment was started, no changes have been made in the method of operation. The value of the salts in resisting fire and in preventing leakage of electricity from hangers has not been tested, nor have any tests been made into its solubility. It is said that the salts set in three or four weeks and thereafter are insoluble. In consequence, ties that are to be used in wet places should be cured for a month, but those which are to be used in dry places can be laid without further delay. The solution penetrates the sapwood and partly into the heartwood of sugar and beech, but with oak the penetration stops at the heartwood. However, 2x4-in. and 2x6-in. boards are penetrated clear through. So far, no evidence of decay has been found in any of the timber treated, yet some is now practically four years old.

Operating Details, Carbon Fuel Co.'s Timber-Treating Plant

4x6-in. x 6-ft. ties treated	25,513
6x6-in. x 8½-ft. ties treated	24,301
Round posts treated	4,961
Other timber treated, cubic feet	23,319.7
Total cubic feet treated	108,400
Total board feet treated	1,300,804
Total labor cost	$ 6,903.27
Wolman salts (27,325 lb.)	7,161.23
Cost per cubic foot, labor	6.36c.
Cost per cubic foot, Wolman salts	6.60c.
Total cost per cubic foot	
Total cost per cubic foot	12.96c.
Total cost per board foot	1.08c.

Reference has been made to the mine that had been closed for four years and had 15,000 ft. of track hardly used, but, nevertheless, needing replacement. Fourteen thousand ties were treated and used in this mine during the first six months of operation of the plant. These have now lasted almost four years; if they last another four, they will pay the cost of the plant, so that the management has cause to feel satisfied with the result of its development. Its experience with merely dipping wood in a tank without suction or pressure to aid in the impregnation had not been satisfactory. The cost for the first five months for the impregnation was 12.12c. per cubic foot, as stated in June, 1930. It will be seen that it has been somewhat greater in the entire period, or 12.96c., as the table shows.

Costs of timber are only too often based on their delivered values. By the time the timber has been handled, hauled to destination, unloaded and put into position a further cost has been added, which may be quite large where the timber is a replacement and rock has to be handled in re-erection, or where ties have to be freed of ballast, the ballast replaced and tamped and the track relined. When posts are replaced, the new post may have to be longer than that at first used. So replacement is but meagerly represented by the delivered cost of new material.

+ NO DELAY IN CHANGE

From Hand to Mechanical Loading at Centralia

Is it possible to change over completely from hand to machine loading without a period of trial and tribulation? Many say "no," but Centralia did it, and the change, described by Paul Weir and J. H. Edwards in May, 1928, was so successful that further changes have been in other directions—better cars, a new preparation plant, improved power distribution.

A MINE in Illinois producing 2,000 tons a day changed its system of mining from hand-loading methods to machine loading without the usual tentative period, and demonstrated by its immediate success that machine loading is so well understood that no longer is it necessary to feel one's way warily when passing from hand to power methods of loading. Even more today than then, experience is available to fit the practice of machine mining to almost any mine.

This mine is the Centralia operation of the Centralia Coal Co., a subsidiary of the Bell & Zoller Coal & Mining Co., located at Centralia, Ill. It is mining the No. 6 seam, a nearly level bed of coal 6 to 8 ft. thick and under 550 ft. of cover. About 14 in. from the bottom is the slate parting known as the "blue band." In general, the immediate roof consists of from 18 in. to 2 ft. of black slate. In some places, the drawslate is an inch or more thick. In others, the limestone comes down on the top of the coal. The floor consists of a bed of hard clay about 4 ft. thick. Fortunately, the mine is free of water.

In *Coal Age* of May, 1928, this mine and its method of working were described by Paul Weir, now vice-president of Bell & Zoller Coal & Mining Co., and J. H. Edwards, associate editor of *Coal Age*. It is well to look in again at the operation and study its present methods. As at the time of writing the first article, the coal is being loaded with Joy and pit-car loaders. Of the former there are six of 5-BU type, which not only load out coal from rooms but load coal from the panel development headings in their territory. The pit-car loaders mentioned, of which there are three, load coal from the main entries.

In general sixteen men are attendant on the operation of each loading machine which works both in a pair of headings and in the dependent rooms. Formerly, as the authors of the original article stated, they all worked on the same shift, but today the coal is undercut on the day shift. Two men handle the loading machine and two the gathering locomotive. The bottom is scrapped by two clean-up men, who also square up the corners of the room. These men load about 3 tons in each of these places. A driller and a dust shoveler follow together, the second a sort of assistant to the first, for he helps the driller to push his machine around and move it into place, and when not thus engaged he cleans out the undercut. All this is done in the day shift, and every item thus receives close supervision. Before the drillers leave in the afternoon, they shoot the bottom shots.

A shooter and two snubbers shoot the upper coal at the end of the night shift. The face is snubbed at the blue band and the refuse is thrown into the gob prior to the shooting of the top holes. Thus the coal transported to the tipple is free of coarse pieces of impurity. Little Giant electric machines, of Chi-

cago Pneumatic Tool Co. make, are used for drilling the holes, and the coal is shot with permissible powder. The coal is all cut by six Goodman 112-AA Universal machines with 8½-ft. cutter bars. These machines have been made standard for this mine, thus cutting down repair parts and simplifying repairs. Each cutting machine cuts on an average about 1,300 sq. ft. per shift, releasing about 330 tons per shift.

Mine cars of 2.6-ton capacity are still in use. Rooms, as ever since the mine started 23 years ago, are 28 ft. wide on 50-ft. centers. Steel ties afford the loading machines the necessary clearance for loading. To provide sufficient power for maximum production, a 300-kw. motor-generator set has been placed as near the center of the territory as possible, this being used as a booster to afford a suitable voltage at the working face, all units being tied in. Thus time losses are avoided that work such havoc with schedules and tonnage when the distribution is from remote stations. Additional cables have been added in all sections of the mine. These have been found here, as elsewhere, to be a vital part of successful mechanized loading.

To meet the demand for a lower power consumption—so necessary for economical operation—100 new steel roller-bearing cars have been added of the same capacity as that of the older cars, which have plain bearings. The distribution of these more easily rolling cars among others not so equipped in each trip has reduced the demand for power materially. As the old plain-bearing cars are removed from service, they will be replaced by steel cars of roller-bearing type, in the certainty that they will still further reduce power demands.

In the autumn of 1929, a new preparation plant, constructed by the Morrow Manufacturing Co. to give a capacity of 400 tons per hour, was completed, the old tipple being entirely dismantled and the new one being put in the same location. It has the latest type of suspended shaker with degradation screens for all sizes, picking tables, loading booms, cross-type mixing conveyor and crusher. These assure uniformity of size, conformity to all market demands and clean coal—a very flexible plant with which changes in size can be made with minimum delay.

Equally gratifying has been the progress in safety. Credit must be given to a continuous safety program, on which much stress has been laid. Every man has been instructed in first aid, and all have state and federal certificates. Efforts in this program have never been allowed to relax. During the past 22 months of operation, seven months passed without a lost-time injury — a record which is a great improvement over that obtained when mechanical loading had not been introduced. The efficiency in safe operation obtained by these means has brought in its train efficiency and cooperation in operation, and a willingness to enable this mechanized mine to hold the good records thus far made, which are about 18 tons per man for the coal loaded by Joy loading machines and 11 tons per man for the coal loaded by pit-car loaders in development work where all the places are narrow and conditions for larger tonnages quite adverse.

+ ECONOMY AND SAFETY

Reward C. & O.'s Mechanical Operations

"Four years of mechanical loading at C. & O. dictate more," declared a story published in these pages in November, 1929. Since then, three years have rolled by—three years which have strengthened the belief of management that mechanical loading means lower costs, cleaner coal and greater safety for the men.

SEVEN years of experience with mechanical loading has demonstrated to the fuel mine operations of the Chesapeake & Ohio Ry. Co. of Eunice, W. Va., of which H. B. Husband is general manager, that the total cost of mechanical loading, including power, explosives, maintenance, interest on investment, depreciation, etc., is much lower than hand-loading costs. This fact, coupled with greater safety in operation and greater purity of product, is the reason why mechanical cutting and loading is still continued at the Chesapeake & Ohio coal mines.

In the issue of *Coal Age* for November, 1929, these operations were described and this further publication is purposed to bring the data up to early in April of the present year. A single Goodman 124-AA slabber is used. The cuts are made in the slate band which lies about 3 ft. above the bottom of the 9-ft. seam. About 80 lin.ft. of face, or 1,370 sq.ft., is cut per day in room and entry workings. Very little slab cutting is being done at present.

The one slabber cuts all the coal that is loaded mechanically. A special alloy bit is used to cope with the hard material that has to be cut. Though no attempt has been made to segregate the costs of repairs on the cutting machine, it is known that these costs are very low. The cutting crew both cuts and drills the face. It is followed by the shot firer, who loads and shoots the holes, and he, in turn, is followed by the loading crew.

In drilling, a center bottom hole is placed on a 15-deg. angle against the bottom. This hole is the first to be fired. Two rib holes, which are drilled on the same angle against the bottom, are fired next. These dispose of the bottom part of the seam below the cut in the slate band. Two rib holes, drilled in the middle of the seam, are fired next. Then follows a center hole, which is placed at a 45-deg. angle against the roof. To round out the section, two rib holes, also on a 45-deg. angle, are fired. This completes the round of shots. The cutting crew drills all these holes by machine. Experience has shown that a 225-ft. room driven 12 ft. wide gives the most economical conditions for slabbing. Slab cuts are made for the entire length of room, increasing its width to 24 ft.

Myers-Whaley No. 4 machines are used for loading. At present, they work only in tight places, and the machines produce 190 tons per 8-hour shift with a loading crew of three men, an operative and two helpers.

Cars are placed by an electric locomotive with a crew of two men—motorman and brakeman. In loading slabs from the side of a room, two tracks are provided, one for the loader and one for the cars. A row of timbers is placed on each side of the track where needed. These are placed by the general track crew of two men.

Enough machine belts have not been used to determine their average life. Two of the machines are seven years old, and each has had two belts, or an average life, so far as these records show, of 3½ years per belt.

Few changes have been made in cutting, shooting and loading since the mine first started. The rooms are longer—225 against 200 ft. The same number of shots are used above and below the slate band. The rooms have been narrowed from 15 ft. to 12 ft. A good sandstone roof, which surmounts the No. 5 Block coal, which is being operated, facilitates operations.

+ COAL DRY-CLEANED

And Desulphurized Prior to Coking at Humphreys

In treating coal for metallurgical purposes, all the refinements of the cleaning art are invoked. At the plant of the Humphreys Coal & Coke Co., described in *Coal Age* shortly after the plant went into operation, coal is crushed, dry cleaned and then desulphurized prior to coking. Results achieved by these processes are told in bringing this story down to date.

SUCH an unusual plant as that of the Humphreys Coal & Coke Co., a subsidiary of the American Radiator Co. and the Standard Sanitary Corporation, suggests many questions to which time alone gives a complete answer. The necessary time for experience having elapsed, since November, 1929, when the first article appeared in *Coal Age,* these notes are written to record the success of the installation.

The Humphreys company crushes all but the lump coal so that 65 per cent will pass through 1/8-in. rectangular screen. This is done so as to separate, as far as possible, the clean coal from coal of an impurity which the company desires to reject. Then the coal is cleaned on four identical American pneumatic Y tables, each with a capacity of 20 tons per hour, two being primary tables and two secondary. The dust rising from these tables is collected by Pangborn cloth-screen filters.

Then again, the coal from the table is desulphurized by a chemical which is added drop by drop to a steam jet which gasifies it. Capillary attraction causes the fine coal to draw the steam and volatized chemical into the spaces between the coal particles and into their interstices. Air is carried with them, and the free sulphur is converted into sulphur dioxide, which escapes. Other sulphur compounds are brought to the surface by the absorbed moisture, where they are oxidized by the air. By cleaning and treatment, the content of sulphur is reduced from 1.10 per cent in the uncleaned, untreated coal to 0.75 per cent in the cleaned and treated product.

A. B. Kelley, the general manager, says that the practice of crushing before cleaning has fully justified itself. The bone coal is so inextricably mixed with pure coal that only crushing to a small size will make a satisfactory separation. Research has definitely proved that, to free the bone entirely, all the coal must be crushed to minus 1/2-in. Improvements in operating practice have brought the percentage of ash in the cleaned coal from 7.25 per cent, that obtained at the first visit, down to 7.00 per cent. The untreated coal ran 9.25 per cent.

Desulphurization is still accomplished satisfactorily with the aid of acid and the steam jet, which reduce the sulphur-percentage figure of the coke about 0.07. Apparently the desulphurization effected is completed by the heat generated in the ovens and, consequently, the method is of value only for coal that is to be made into coke.

The coke now being made in these beehive ovens is stronger than ever. In 1929, after the shatter test, 88 per cent passed over a 2-in. screen. Now 90 per cent so passes, whereas 65 per cent only remained on a 2-in. screen when the coke was made from untreated coal. With a coke of 90-per cent shatter test, the consumer gets a product that he can use without loss, for it has a minimum of the fines for which he has no use.

Consumers desire a dense coke with a minimum of pore space. The porosity of the coke made of the uncleaned coal was said to be 48 per cent, but this was illusory, for the slate particles in the coke sealed up many of the pores and prevented a proper porosity test from being made. The cleaned coal had a porosity of 52 per cent when the earlier article was written. It now has 51 per cent.

The management prefers a dry-cleaned coal because, with cleaning of that type, the moisture content of the cleaned coal is kept low, and as a result a dense coke of low porosity is obtained. Coal cleaned by washing in water can, of course, be dried with efficient dewatering equipment, but the management regards the expense as one to be avoided, hence the use of dry-cleaning equipment. With wet cleaning, the finest of the slimes may be lost, whereas, with an air filter, they can be recovered.

At the Humphreys plant, most of the minus 20-mesh dust is recovered and classified into three standard grades for marketing as sea-coal facing. Fortunately, the dust is very clean, having less than 7 per cent of ash and 0.85 per cent of sulphur. It makes, at this plant, an unusually fine grade of facing, the particles of dust under the microscope showing an entirely different structure from that of the product made by the grinding of larger coal, as might be expected with coal gathered by air flotation.

Thus far, the coal has not been dedusted prior to introducing it into the cleaning plant. A study has been made of the possibility of this treatment, for it is the logical, more economical and safer way to meet the problem.

The coal being cleaned and treated is from the Pittsburgh seam and, without cleaning, has as stated, 9.25 per cent of ash and 1.10 per cent of sulphur, but even such pure coals as these it is becoming quite customary to clean, because, thus freed of impurity, they make a better coke, with a lower percentage of fines as taken from the oven and a smaller loss from shattering in transit and handling. The coal is coked in beehive ovens, but the quality of the oven output makes it, nevertheless, a competitor of byproduct coke.

OPERATING IDEAS

From Production, Electrical and Mechanical Men

Union Pacific Adopts Lubrication Code To Insure Efficiency and Cut Waste

RECOGNIZING that one of the many problems of the age of mechanization is the proper lubrication of machinery, the Union Pacific Coal Co., Rock Springs, Wyo., after a careful study of the question, adopted a set of lubrication standards in 1932. These standards, developed under the direction of the general master mechanic and approved by the assistant general manager and the vice-president and general manager, cover, in addition to lubrication charts, the purchase, storage, delivery and application of oils and greases for the double purpose of reducing waste and insuring the application of the right lubricant at the right place.

Purchase of all lubricants is placed in the hands of the purchasing agent, and lubricants other than those specified in the two lubrication charts adopted (one for the Rock Springs, Reliance, Winton and Superior mines, and the other for the Hanna operation) may not be requisitioned without the consent of the chief electrician or the general master mechanic, with the approval of the assistant general manager. Upon delivery, all lubricants are stored in the main oil houses under the supervision of the local material clerks. Upon receipt of the proper requisition, lubricants, depending upon type and service, are delivered to mine oil houses or issued, only in such quantities as are immediately necessary, to the persons responsible for their application.

Oils for general use underground are distributed in 2½- or 3-gal. (Hanna, 5-gal.) containers of special design. Containers for engine oil are plain, while blue containers denote oils for cutter chains, ropes and rollers. Each underground unit is expected to have on hand at all times one container of each oil regularly used, and the number of the unit is arc-welded onto the container. Containers are filled in the outside oil house, generally by the car greaser. When necessary, they may be transported into the mine in ordinary trips, provided the car is flagged "For Handling Material Only." Where a special man is employed on the night shift for oiling machinery, container transportation is confined to that shift.

When a special oiler is not employed, only one kind of grease is used for general greasing (locomotive journal boxes and waste-packed mining-machine boxes excepted); this grease is transported to each unit in special grease containers (10- to 15-lb.) in the same way as oils. Grease for locomotive journal boxes and waste-packed machine boxes is distributed in special 5-lb. containers. This grease is issued by the machine boss only on requisition, and he keeps a small supply on hand for refilling containers. Crater compound for gear dressing is delivered in the original 25-lb. containers.

Where a special oiler is employed, greases are delivered to centrally located depots in the mine, from which the oiler distributes them on demand. This applies especially to grease for application with grease guns through Alemite fittings. The oiler also is charged with the duty of overseeing storage. All lubricants are to be applied only with the proper equipment—quart oil cans, grease guns, etc.

In general, the machine boss is in charge of lubrication of mine machinery, and it is his duty to give especial attention to, and at regular intervals personally inspect, the lubrication of waste-packed boxes. The machine boss also instructs employees in the proper use and application of lubricants.

The foreman of each mechanical-loading unit is directly responsible for the proper lubrication of the cutting and loading machinery in his section. One employee for each unit is designated to handle and apply lubricants, and this employee receives instruction in his task from the foreman.

Where a special oiler is employed, he is charged with the responsibility of lubricating certain machinery. If a complete job cannot be done during the working shifts, he is employed on idle days or at night. The special oiler is expected to have sufficient mechanical knowledge to detect defects and make minor repairs, reporting to the mine foreman the condition of the equipment and the machinery needing repairs.

Large oil and grease cups are advocated wherever feasible, to cut down frequency of application. Storage of unnecessary quantities of lubricants underground is condemned, and employees are urged to keep lubricants clean and grease cans covered, and to transport lubricants only in clean containers.

In addition to one clas of lubricant for general oiling of all machinery, including the hydraulic system of the Joy loading machines, the lubrication chart for the Rock Springs, Reliance, Winton and Superior operations covers fourteen oils and greases. Lubricant classifications, in addition to the above, are:

(1) Turbines, motor-generator sets and motors on which large tonnage depends: (2) crankcase of inclosed shaker conveyor drives; (3) plain-bearing pit cars; (4) all machines with Alemite fittings; (5) gear dressing, open gears; (6) cylinder oil, air compressor; (7) bit quenching; (8) pipe work; (9) rope dressing, plain-bearing slope rollers, cutter chains; (10) roller-bearing pit cars; (11) all grease cups; (12) waste-packed boxes of locomotives and mining machines; (13) speed reducers; (14) steam cylinders.

Items 1, 6, 7, 8, 12, 13 and 14 are distributed under the supervision of the master mechanic or electrician. Item 2 is for application by the machine boss only, while Item 4 is for use only where an oiler with a grease gun is employed. Thirteen items are included in the Hanna lubrication chart, which differs from that for the other four operations by the elimination of some types of lubricants and the addition of certain others for special application.

Correcting Flashover Troubles On Rotary Converter

An outline of the various steps in correcting flashover troubles on a 500-kw. rotary converter at a railway booster station is given in a recent issue of *Power* by Thomas E. Miller, Nashville, Tenn. This converter, Mr. Miller writes, was very sensitive to power-supply disturbances, and as time wore on the trouble became so bad that the commutator would flash over two or three times a day, with attendant damage to brushes, rings and commutator.

To correct the situation, the operating officials first resorted to a thorough cleaning. The machine was equipped with a full set of asbestos-board flash barriers, and considerable copper was scraped off these. Pilot brushes were found to be too soft and subject to shattering, and were replaced with a harder grade. While flashovers were eliminated for a few days, they soon began to occur again. As a result, a 1,500-volt, one-microfarad, condenser-type lightning arrester was connected in series with a 10-amp., 600-volt fuse directly across the commutator. Flashovers were eliminated, but the factory insulation between the commutator bars and the clamping ring was so badly burned that it was decided to lengthen the path to the ground and reinsulate the ring in one job.

A wooden ring was turned in four sections, as shown in the illustration, to match the steel clamping ring. One-inch, well-seasoned oak was used, and four sections were used for cross-sectional strength. Each piece was drilled and countersunk ⅜ in. for ¼-in. flat-headed machine screws. Slight errors in drilling made interchangeability of the pieces impracticable, so the steel clamping ring was drilled and tapped and each piece fastened on before the next was marked off.

Pieces of canvas were fastened between the wood and steel rings, with the excess hanging toward the center. After all the screws had been tightened, a coat of shellac was applied to the outside surface of the rings. While still sticky, varnished cambric tape was wrapped around both rings until insulation comparable to the factory standard was obtained. Another coat of shellac was then applied, and the canvas was pulled back over the rings and tied temporarily with a cord. After wrinkles had been smoothed out, a permanent cord band was put over the canvas, starting at the outer edge.

Two thin coats of shellac were then applied, followed by a thick one. The exposed canvas was then ironed out with a hot soldering iron to harden it and prevent the shellac from being thrown off. About two days later a first coat of red oil-proof insulating cement was applied, followed by a second the next day. Flashover trouble was almost entirely eliminated, and the insulation has held up well.

What to Do?

A little knowledge put back in one corner of the brain beats any amount of head scratching when an unexpected problem comes up. One way of gaining knowledge is by personal experience, but personal experience doesn't cover everything, while the Operating Ideas section does. Sooner or later, a problem may be expected to come up for which a solution is offered in these pages. Similarly, other practical operating and electrical men may need the benefit of your experience. *Coal Age* will welcome the opportunity to publish it, and will pay $5 or more each for acceptable examples. A sketch or photograph may help to make them clearer.

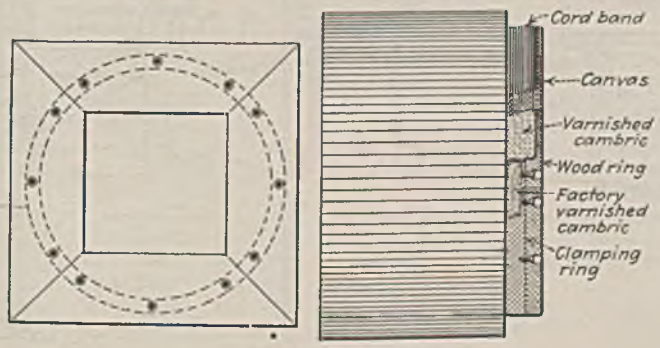
Changing Drill to Wrench

C. L. Burdette, chief electrician, Dunedin Coal Co., Concho, W. Va., offers a method for quickly converting a portable electric drill into a speed wrench. No change is made in the drill itself, the conversion being accomplished by welding

Top, Socket Wrench in Drill; Bottom, Drill Being Used as a Speed Wrench

a socket wrench onto the shank of a drill bit, the twist first being broken off. Nuts are started by hand, after which the speed wrench is applied. When the nuts are run down tight, the drill stops and the current is switched off immediately. Stopping the drill under load has shown no ill effects, Mr. Burdette writes, as one drill (Black & Decker, 110 volts a.c., ⅜-in. bits) has operated four years without any repairs to the armature or bearings. A deep socket (1⅛ in.) is used to insure a firm grip on the nut until it is screwed down in spite of the projection of the bolt.

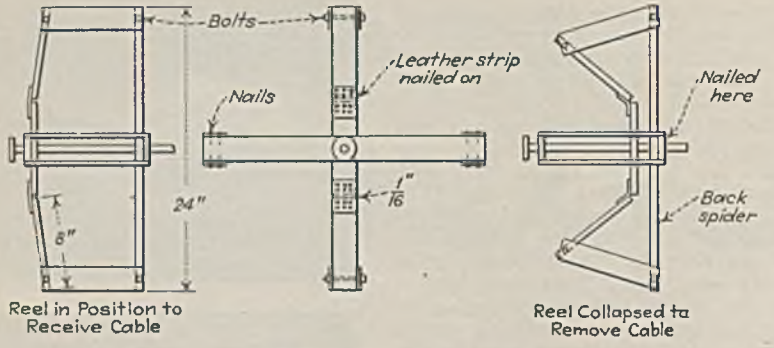
Left, Construction of Wood Ring; Right, Arrangement of Insulation on Steel and Wood Rings



Collapsible Reel Facilitates Cable Coiling

Mine and plant men not infrequently find it necessary to string out heavily insulated cable, using it for a time and then coiling it up again for storage. To coil such a cable as a sailor would coil a rope is difficult, as the cable resists twisting. A reel with a fixed diameter is of considerable assistance in the actual coiling operation, but the finished coil cannot be removed readily. As a solution for the problems encountered, Frank H. Kneeland, Benton, Ill., offers the collapsible reel shown in the illustrations, which may be made of scrap lumber and fittings. Dimensions are only nominal, and may be varied to suit conditions.

The back spider of the reel is made by



Construction and Operation of Collapsible Cable Reel

nailing two 1x3x24-in. boards together to form a cross, as shown in the sketch. The arms of the front spider, however, are not joined together, and while one is made of a 1x3x24-in. board, the other is made of three 1x3x8-in. pieces. These short boards are fastened together with pieces of leather, such as portions of an old belt, about 4 in. long and preferably as wide as the boards. A gap about ½ in. wide is left between the ends of the short boards to form two more or less flexible joints.

One arm of the rear spider and the 1x3x24-in. arm of the front spider are joined solidly together by nailing pieces of lagging to the outer ends, as shown. The other arm of the rear spider is joined to the collapsible arm of the front spider with lagging (in this case about ¼ in. shorter than that used on the other two arms), but bolts are used to permit movement. Both spiders are then bored to fit over a shaft of 1-in. pipe or similar material.

When the cable is to be coiled, the collapsible arm is pulled forward until it reaches the position shown at the left in the sketch, whereupon it locks itself into place. The end of the cable is then temporarily attached to the lagging or a spider arm, and the reel is turned by hand until the cable is wound up. After the cable is tied together with straps or cord, the collapsible arm is pushed toward the rear spider, as shown at the right in the sketch. This pulls the lagging inward, freeing the coil. If desired, and the cable has been wound loosely enough, the reel may be used for uncoiling cable by reversing the removal operation.

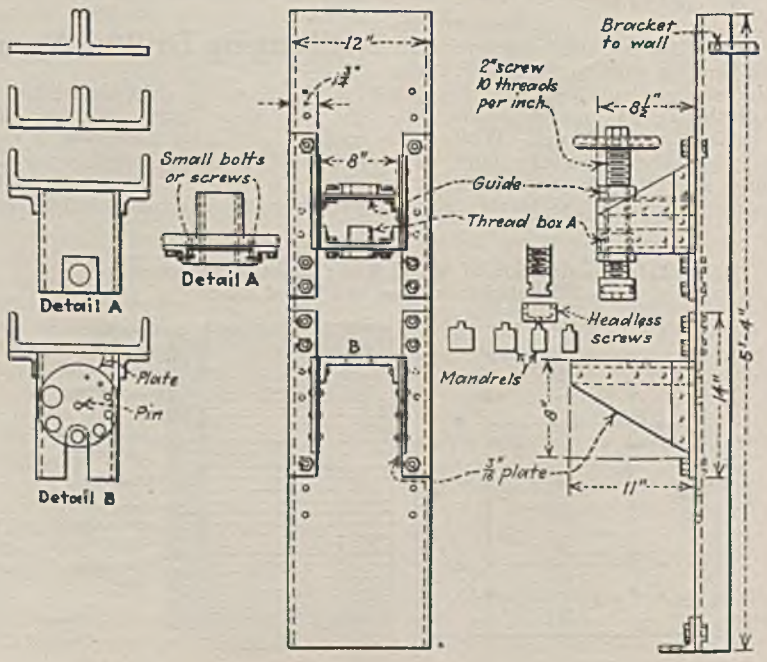
Showing Reel With Arm Collapsed

Hand-Operated Press

John J. Nolan, Terre Haute, Ind., supplies the following description and sketch of a small hand-operated press for light work, such as straightening small shafts or rods or pressing out bushings and pinions. This press, he declares, reduces the time of setting and lining up work that would be required with the larger hydraulic press with which mine repair shops usually are equipped. Repairmen frequently get out of the habit of using the larger tool for this reason, and as a result requisition new parts when the old parts could be salvaged.

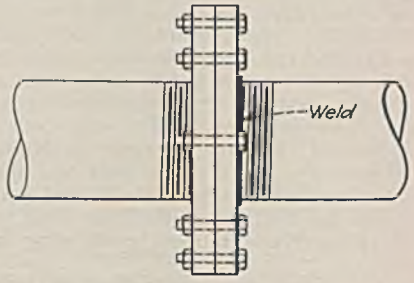
Approximate dimensions for a small hand-operated press are shown in the accompanying sketch. The standard on which the press is mounted may be made up of a single channel or two channels or angles bolted toegther. Both the top and bottom parts of the press can be raised and lowered to suit the work by boring extra holes in the standard, as shown. The round plate shown in Detail *B* is not absolutely necessary, but is a handy accessory in various kinds of work. Construction material usually is available from wrecking companies in the community, or from the stock at the mine.

Construction Details for Small Hand-Operated Press



Arc-Welding Solves Problem Of Pipe Connection

In starting up the mines of the Four Seam Coal Corporation at Diablock, Ky., writes Lloyd G. Fitzgerald, mining engineer, it was necessary to join a 3-in. pipe threaded with twelve threads per inch to a pipe with standard threads. Standard pipe fittings were available, but there were no 3-in. pipe dies on hand. The problem of making the connection was solved by arc-welding one-half of a flange coupling to the end of a length of non-standard pipe. The other half of the coupling was screwed to the standard-thread pipe, after which the union was lined and bolted together.



Welding Solved This Pipe-Connection Problem

WORD from the FIELD

Hours, Wages and Output Control Asked of Congress

From the mere limitation of hours of work to 30 per week, the Black bill, a heritage from last year's session of Congress, will be broadened to grant to the Department of Labor wide powers for control of production, hours and wages in industrial plants and mines and quarries, if a tentative measure submitted to the House Labor Committee by Secretary of Labor Perkins is passed. The original Black bill was passed by the Senate early in April. House consideration brought out Miss Perkins' proposals for making the bill workable, which were embodied in the measure which went to the House Labor Committee on April 18. Public hearings on the proposals started April 25.

The Secretary's proposals retain the 6-hour day and the 30-hour week for all products moving in interstate commerce, with the exception of milk or cream. In exceptional cases, however, an "Hours of Work" board, representing the Labor Department and employers and employees, could grant permission to employ men for not over eight hours per day, or 40 hours per week, for not over ten weeks per year.

More significant, however, the Secretary of Labor would be empowered to further limit the total hours of work in any plant found to be "disturbing and preventing a fair balance of production in its industry and bringing about overproduction or unfair competition through excessively long periods of operation." Furthermore, upon a finding by the Secretary that a substantial number of workers in any industry are not receiving a wage "fairly and reasonably commensurate with the value of service rendered or sufficient for the maintenance of a reasonable standard of living," wage boards similar to the "Hours of Work" boards would be set up to determine what the proper wages should be. Establishments found to be paying improper wages would be directed to revise their scales under penalty of prosecution in the courts.

Mines Buy Power Plants

Contractors are now engaged in the installation of a new power plant at the Yancey (Ky.) mine of the Harlan Fuel Co. Equipment includes a Combustion Engineering Corporation VM-Type bent-tube boiler rated at 252 hp., a 7x9-ft. Cokal Pulverzone stoker capable of delivering 200 per cent of boiler rating continuously on minus ¼-in. fuel, a 26x35 Skinner "Universal Unaflow" engine direct-connected to a 625-kva., 500-kw., 2,300-volt, 60-cycle General Electric generator. Fuel will consist of nut-and-slack with a large proportion of minus ¼-in. refuse coal. The plant is being constructed by the Nashville Machine &

Supply Co., sales agent for the Skinner Engine Co.

Lillybrook Coal Co. has purchased a new mine power plant for its Lillybrook (W. Va.) operations. Equipment will include two 750-kva. generators direct-connected to Skinner Engine Co., "Universal Unaflow" engines.

Illinois Adopts New Sales Plan

"Quality Circle" operators in southern Illinois announced late in March a new summer buying program, under the terms of which dealers placing orders between April 1 and Aug. 31 have the privilege of buying an equal number of cars of the same size at the same price during the remaining seven months of the coal year. The plan applies to domestic sizes only. Coal sold to dealers below current prices for delivery to steam plants, schools and public buildings will be covered by another plan.

Bituminous Research Charter

Bituminous Coal Research, Inc., organized under the direction of the research committee of the National Coal Association, received a Delaware charter early in April. Plans are now under way for beginning operation, but it is expected that several months will elapse before work is started. According to the present program, technical research will be carried on at the Battelle Memorial Institute, Columbus, Ohio.

Coal and Coke Shipments Expected to Rise

Shipments of coal and coke are expected to rise 16 per cent in the second quarter of 1933, as compared with the same period in 1932, according to estimates compiled by the thirteen Shippers' Advisory Boards. Loadings in the second quarter are expected to reach a total of 1,232,019 cars of coal and coke, against actual loadings of 1,061,840 cars in the second quarter in 1931. For the 29 principal commodities, comprising over 90 per cent of the total carload traffic, the various boards estimate a decline of 0.3 per cent in the second quarter of this year, or from 3,618,392 cars in 1932 to 3,606,491 cars in 1933.

Bituminous Industry Opposes Muscle Shoals Plan

Muscle Shoals again moved into the limelight in April as a part of President Roosevelt's plan for the economic development of the Tennessee River basin, including flood control, afforestation and prevention of soil erosion, elimination of marginal lands from agricultural use, diversification of industry and, incidentally, power production and distribution and the manufacture of fertilizer. A bill embodying the President's ideas and providing for the creation of the Tennessee Valley Authority was introduced in the Senate on April 10 by Senator Norris, Nebraska, and in the house by Representative McSwain, South Carolina. The Senate Committee on Agriculture and Forestry promptly sent the measure to that body with a favorable report. During the course of hearings before the House Military Affairs Committee, last month, Milton H. Fies, vice-president, DeBardeleben Coal Corporation, set forth the opposition of Alabama producers to government competition in the sale of electrical energy, and again advocated the stand taken by the Alabama operators last year that the Muscle Shoals development should be leased to private interests for the production of chemicals and fertilizers, scientific research and experimentation for the benefit of agriculture only. Leasing of Muscle Shoals for these uses would immediately increase the demand for Alabama and Tennessee coals by 750,000 tons annually, he declared.

In event the power developments incorporated in the proposed legislation were carried through. 1,843,000 tons of coal would be displaced, causing a loss of $2,949,000 to coal operators and railroads in the territory affected, according to an analysis prepared for the National Coal Association by one of the leading research engineers of the country. In addition to the Wilson dam and the steam power plant at Muscle Shoals, the program provides for the construction of four new power plants, one at Cove Creek, on the Clinch River a short distance above Knoxville, and three others between that city and Chattanooga. The last three already have been authorized in a recent Rivers and Harbors Act.

These four plants, plus the Muscle Shoals plants, would have a generating capacity of nearly 3,700,000,000 kw.-hr. per year, according to the engineer's report. Private companies in the states to which energy would be distributed have a capacity of 4,000,000,000 kw.-hr., and a market for only 3,000,000,000 kw.-hr. Assuming a delivered price of $1.60 per ton for coal and a generating efficiency of 1 lb. of coal per kilowatt-hour, coal producers in Alabama, Tennessee, Kentucky, West Virginia and Virginia would stand to lose 1,843,000 tons of coal annually, while the money loss of producers and carriers would be nearly $3,000,000.

Appalachian Coals, Inc., Begins Operations; Other Regions Consider Agency Plan

APPALACHIAN COALS, INC., began formal operation on April 17, following the prior issuance of a 56-page price list covering lake, domestic, steam, byproduct, retort-gas and water-gas coals from the Logan, Williamson, Kanawha, Big Sandy, Elkhorn, Hazard, Harlan, southern Appalachian and southwest Virginia districts. In advertisements appearing over its signature, the agency declared that it is engaged solely in the wholesale sale and distribution of coal, and that consumers would be furnished, in general, the same coals or others if they were found to be more efficient at a cost no greater than that of less efficient coals and service. Wholesalers were advised that the agency's desire was to keep all available trade channels open, while the retail dealer was assured of a position as the direct outlet to the householder and small industrial user.

Early in the month, the receivers of the Consolidation Coal Co. were given authority to subscribe for $35,000 in stock in the agency, and J. Noble Snider, vice-president in charge of sales, was elected a director. Other additions to the company roster were the Elkhorn-Piney Coal Corporation, with operations in West Virginia and Kentucky, and the Black Star Coal Co., Alva, Ky. B. F. Reed, vice-president, Black Star company, also was added to the directorate.

Central Pennsylvania producers, following a meeting held on March 31, applied for a charter for Eastern Coals, Inc. A subcommittee made up of Heath S. Clark, vice-president, Rochester & Pittsburgh Coal Co.; Charles O'Neill, vice-president, Peale, Peacock & Kerr, Inc.; J. W. Searles, president, Pennsylvania Coal & Coke Corporation; J. R. Caseley, president, Buffalo & Susquehanna Coal & Coke Co., and Charles A. Owen, president, Imperial Coal Corporation, was named to shape organization plans.

Northern West Virginia operators, at a meeting in Fairmont, W. Va., April 18, voted the formation of an agency to be known as Northern West Virginia Coals, Inc. The conference adopted a motion providing that subscription contracts would not be binding until signatures from companies in the 12½ counties producing 15,000,000 tons in 1931 were obtained. A total of 5,000,000 tons signed up at the meeting, and R. M. Hite, Virginia-Pittsburgh Coal & Coke Co.; H. L. Findlay, Simpson Creek Collieries Co., and S. D. Brady, Jr., Osage Coal Co., were appointed to a committee to solicit membership.

Following an earlier meeting held during the opening days of the month, representatives from eastern Ohio fields and the northern Panhandle of West Virginia approved plans for the formation of Northern Coals, Inc., at a meeting in Cleveland, Ohio, April 14. Final steps in the organization of the agency will await the action of a number of larger producers who were not represented at the meeting. One hundred operators attended the meeting earlier in the month, and at that time, twelve, representing the major part of the production in the No. 8, Middle District and Cambridge fields, signed contracts contingent upon the perfection of the agency. These were: Hanna, Youghiogheny & Ohio, United States, Big Five, Akron, Ohio Block, Blue Shaft and Friends coal companies, Lorain Coal & Dock Co., Warner and Cambridge collieries companies, and the Standard Mining Co.

Following preliminary informal conferences early in the month, the larger operators in western Pennsylvania met on April 21 and voted to take steps for the formation of a sales agency. Companies invited to attend included: Westmoreland, Ocean, Pittsburgh, Youghiogheny & Ohio, Pittsburgh Terminal and Carnegie coal companies; Keystone and Jamison coal and coke companies; W. J. Rainey, Inc., and the Union Collieries Co. Arrangements for a general meeting were placed in the hands of E. B. Leisenring, president, Westmoreland Coal Co.; H. F. Bovard, president, Keystone Coal & Coke Co., and J. D. A. Morrow, president, Pittsburgh Coal Co.

Operators from the low-volatile fields of southern West Virginia held a number of meetings in April, but took no direct action besides sending out a questionnaire to develop information to serve as a basis for further steps.

Nova Scotia Gets Fuel Order

Fuel requirements of the Canadian National Railways east of Toronto will be supplied by Nova Scotia mines, according to an announcement in the Provincial Legislature, April 7. Assurance of this unexpected market of 300,000 tons per year was coupled with the statement that the federal subvention on coal to central Canada would be increased from its present maximum of $2 to $2.50 per ton.

Coal Production Drops

Bituminous coal production dropped to 23,646,000 net tons in March, according to preliminary estimates by the U. S. Bureau of Mines. Output in February was 27,134,000 tons, while the March, 1932, production was 32,250,000 tons. Anthracite production last month was 4,503,000 tons, against 4,275,000 tons in February and 4,789,000 tons in March of last year.

Another Coal Bill?

A new coal control bill very similar to his previous measure, which was modelled on the British Coal Mines Act of 1930, has been drawn up by Representative Lewis, Maryland, with the assistance of the United Mine Workers. While it has not yet been introduced, it is understood that the measure has been reviewed by the Secretaries of Labor and the Interior, and tentatively approved by the former.

Opinion is expressed in some Washington quarters that in case a minimum wage law is enacted, either as a part of the Black bill or an independent measure, the administration forces will not back a coal measure, though there has been no assurance from any quarter that the administration has definitely decided to support coal legislation in the event a minimum wage law is not enacted.

Following the lead of the Illinois Coal Operators' Association, which early in April advised the Secretaries of Commerce and Labor of its willingness to cooperate in shaping remedial measures for the industry and suggested that Indiana operators take similar action, representatives of the Indiana Coal Operators' Association, Indiana Coal Producers' Association and the Coal Trade Association of Indiana, at a meeting in Terre Haute, April 17, appointed a special committee to draft a program to govern the members of the three associations in their attitude toward proposed and pending legislation. This committee met with representatives of the Illinois operators, and later requested an appointment with the Secretaries of Commerce and Labor.

Reports from western Pennsylvania reveal that a number of operators have affixed their signatures to a petition to the President opposing the sales agency plan on the ground that it is not a satisfactory solution to the problems of the industry and requesting federal control.

Mid-West Conference Postponed

The sixth annual Mid-West Bituminous Coal Conference has been postponed by the sponsors until 1934, owing to unsettled economic conditions that might prevent a satisfactory attendance, curtailed university budgets and a desire to concentrate interest in fuel and engineering matters on Engineering Week, to be held at Chicago, June 25-30.

Connellsville Drops Lease

Connellsville By-Product Coal Co., a subsidiary of the Valley Camp Coal Co., has surrendered its lease on 1,500 acres in the Scotts Run district of of West Virginia to the Cochran Coal & Coke Co., owners. The latter, it was announced, will either lease the property or operate the 2,500-ton mine itself.

Oklahoma Mines Sold

Recent receivers' sales in Oklahoma have resulted in four mines passing into new hands. Two complete operations of the Milby & Dow Coal & Mining Co. at Dow, originally valued at $500,000, went to M. C. Scheble, of McAlester, for $100, subject to back taxes of approximately $6,000. Sale of the Blanco Coal Co. operation at Blanco brought $750, while the No. 5 mine and lease of the Osage Coal Co. at Krebs was sold to Claude Hawkins for $4,500. The Osage company filed a voluntary petition in bankruptcy a short time ago, listing liabilities of $380,000, with assets of approximately the same amount. Original cost of the machinery alone was said to have been $100,000. J. S. Martin and J. S. Jamison have been appointed receivers for the McAlpine Coal Co.

Anthracite Operators Again Ask Wage Cut; Insurgents Invade Southern Illinois

ANTHRACITE operators, for the second time in less than a year, again requested a wage reduction from the United Mine Workers at a meeting of the permanent committee of six operators and six miners set up by the 1930 agreement to consider the problems of the industry which got under way at the Bellevue-Stratford Hotel, Philadelphia, Pa., April 19. The operators again found the miners unwilling to accede to the operators' request for a 35 per cent cut, though disposed, according to reports, to grant some relief in exchange for concessions by the companies. These concessions were reported to inlude some equalization of work between collieries, which has been a sore point with the union for some time.

The attitude of the miners' representatives, however, underwent a change in later sessions in response to the country's departure from the gold standard and the inflation program brought out by the administration. Following the lead of William Green, president, American Federation of Labor, who declared on April 20 that wages must go up to offset the price increases expected from inflation, the miners were of the opinion that, in case the administration's inflationary measures went through, there would be no necessity for a change in contract rates, inasmuch as wages automatically would be reduced.

Interest in Illinois in April centered on the efforts of the Progressive Miners of America to oust the United Mine Workers from Franklin, Perry and Williamson counties, in southern Illinois. Plans for mass picketing in connection with a strike called on March 27 were broken up by peace officers with the backing of the operators and the United Mine Workers, though sporadic attempts were made later under the protection of an injunction. This restraint, however, lost its force late in April, when the sheriffs of the three counties, on the advice of their respective state's attorneys, decided to ignore the injunction on the ground that picketing would result in bloodshed. Lacking this weapon, the Progressives turned to an intensive propaganda program and appeals to the President.

On April 17, State's Attorney Hart, Franklin County, announced the receipt of a sworn statement from Pete Allard, one of the organizers of the Progressive union and brother of Gerry Allard, editor of the *Progressive Miner*, charging that the Progressive union "is in the interest of the Communists, and is receiving support from the Communist party." Hart declared that the statement charged that the Progressive leaders were being paid by the Communist party, and that it explained in detail a number of murders in union warfare. Allard's statements were immediately denied by his brother Gerry, and by Claude Pearcy, president of the insurgents, who declared that an investigation of the union by state officials would be welcome.

Iowa miners included in District 13 of the United Mine Workers ratified a reduced scale by a substantial margin early in April, after rejecting practically the same proposal in February. Under the new agreement, the basic day scale was cut from $5.80 per day to $4.70, while the base tonnage rate was reduced from $1.04 to 81c.

Southern Ohio operators and miners, at the suggestion of Governor White, met at Columbus, Ohio, April 17, to discuss a new wage and working agreement to replace the one expiring May 17. The expiring agreement, which was based on a plan of settlement drawn up by the Governor, includes a scale of $3.25 a day for day men and 38c. a ton for loading, and ended a nine months' strike.

Prices Unmoved by Inflation

Aside from a slight increase in interest in long-term contracts, the coal markets of the country as yet have been little influenced by the abandonment of the gold standard by the United States and the administration's inflation program. Prices, according to most authorities, have not been affected to date, though one or two sales officials report a slight reduction in the excessive cutting which has prevailed in late months. These officials also mention that the operation of Appalachian Coals, Inc., has had a steadying influence on the price structure. The majority of sales officials are noncommittal on future developments, though it is expected that the slight but noticeable increase in optimism will react favorably on sales and prices.

Freight Rate Hearings Begin

The Interstate Commerce Commission's investigation into the reasonableness of freight rates throughout the country, precipitated by the request of farm organizations and the National Coal Association for a reduction in rates on basic commodities, got under way in Washington, D. C., April 24. J. D. Battle, traffic manager, National Coal Association, was the first witness for the shippers, and reiterated the association's contention that a cut in soft-coal rates would enable both the industry and the carriers to recover a large part of the tonnage lost to competitive fuels. The Commission denied a request of the association that the freight rate surcharges exended to Sept. 30 be suspended.

Stuart Lauded by Shaw

Charles E. Stuart, president of Stuart, James & Cooke, Inc., was singled out for one of George Bernard Shaw's rare compliments during the latter's American appearance at the Metropolitan Opera House in New York City, April 11. During the course of the dramatist's address, Mr. Stuart was referred to as "the American who brought the very remarkable report in which the Russians had explained to them how to do it," though his identity was not revealed until the later receipt of a letter from Mr. Shaw expressing the hope that "you may do as great a public service to the United States in its pressing work of reconstruction as you did for the U.S.S.R."

The report referred to by Mr. Shaw was a comprehensive study of the Russian coal industry submitted by Stuart, James & Cooke engineers in 1930. This study pointed out the weaknesses of the Russian industry, advocated the elimination of waste and inefficiency and suggested the payment of workers in accordance with individual ability and enterprise, instead of on a horizontal basis. These recommendations were adopted almost in their entirety in Stalin's edict of June, 1931, empowering management to recognize with increased wages exceptional ability and energy.

Mr. Stuart, who has stressed the concept of national economic planning embodied in the Soviet organization in addresses and articles published in this country, is a strong advocate of planned economy in the United States as the only way out of the depression. Such planning, however, should be initiated by industry itself, he believes, and not, as in Russia, imposed by governmental edict. The government's participation in economic planning in this country should be cooperative with industry.

Economic Problems Feature N.C.A. Program

The economic future of the bituminous industry, with special reference to merchandising and research, will dominate the annual meeting of the National Coal Association, to be held at the Drake Hotel, Chicago, next month. The first technical session is scheduled for the morning of June 15, and in addition to an address by C. E. Bockus, president, and the reports of officers and committee chairmen, will feature a discussion of "Marketing—The Regional Sales Agency Plan," by H. L. Findlay, vice-president, Youghiogheny & Ohio Coal Co., and James D. Francis, president, Appalachian Coals, Inc., J. W. Searles, president, Pennsylvania Coal & Coke Corporation, will preside.

Officials and members of district operators' associations will discuss their problems at a luncheon meeting on June 15, with R. H. Sherwood, chairman, Coal Trade Association of Indiana, presiding. William G. Caperton, president, Smokeless Coal Operators' Association of West Virginia, will lead the discussion. At the afternoon session, featuring research, Arthur Hewitt, president, American Gas Association, will discuss the research program of the gas industry.

Fuel distribution is the subject of the morning session on June 16, W. J. Jenkins, president, Consolidated Coal Co. of St. Louis, presiding. A feature of the session will be an address on "Credit Protection," by W. J. McGee, president, National Coal Credit Corporation.

Safety will be the theme of the afternoon session on June 16, with Ira Clemens, Commercial Fuel Co., Pittsburg, Kan., presiding, and Milton H. Fies, vice-president, DeBardeleben Coal Corporation, delivering the chief address. Discussion will be led by E. J. Newbaker, vice-president, Berwind-White Coal Mining Co., and Dr. L. E. Young, vice-president, Pittsburgh Coal Co. Thurlow G. Essington, counsel, Illinois Coal Operators' Association, will speak on "Workmen's Compensation."

Push Welsh Coal in Canada

South Wales exporters, according to semi-official British reports, are getting ready for a big Canadian push in the coming summer months. On the basis of activity in the early part of this year, it is expected that the record 1932 total of 1,399, 086 net tons of Welsh anthracite will be surpassed this year. The port of Montreal alone is expected to receive about 1,600,000 tons of coal, the bulk of which will come from South Wales. Interested exporters are said to be considering a scheme to charter a fleet of small steamers to carry coal from Welsh ports to the Great Lakes, via the canals above Montreal.

Obituary

LOUIS RAFETTO, president, Montfair Gas Coal Co., Monongah, W. Va., and the West Virginia & Pennsylvania Coal Co., sales agent, Philadelphia, died at his home in the latter city on April 10 from effects of a stroke suffered in Florida a few weeks ago.

DR. ERNST JUNGST, secretary, Verein für die Bergbaulichen Interessen, an association of coal interests in the Ruhr, and economic editor of *Glückauf,* died at Essen, Germany, April 7.

JOSEPH E. EDGEWORTH, 34, superintendent, Lion Coal Co., Rock Springs, Wyo., was killed April 4 when he was caught between a car and a loader in the company's mine. Mr. Edgeworth was a past president of the Wyoming Section, American Institute of Mining and Metallurgical Engineers.

JOHN L. BAKER, president of the newly-organized Baker-Dora Coal Co., Jasonville, Ind., died suddenly in April from a heart attack.

GEORGE O. SPRING, general superintendent, Tulsa County Coal Co., Collinsville, Okla., died at a Tulsa hospital in April of pneumonia following an attack of influenza. Mr. Spring went to Oklahoma from Colorado in 1916, and located in Collinsville in 1924.

1932 Financial Reports

M. A. Hanna Co. and subsidiaries report for 1932 a net profit of $67,886, including income on stock held in the treasury and after interest, depreciation, depletion, taxes and other charges, equal to $5.29 a share on 136,422 no-par preferred shares carrying a dividend rate of $7. Net profits in 1931 totaled $1,377,925, equal, after preferred dividends, to 39c. a share on 1,016,961 no-par common shares.

Indiana & Illinois Coal Corporation reports a net loss of $136,064 in 1932, after depreciation, expenses and other deductions, compared with a net loss of $115,679 in 1931.

International Coal & Coke Co., Ltd., reports a net income of $22,375 in 1932, after depletion, depreciation and income taxes and including income on investments. Net profit in 1931 was $23,656.

St. Louis, Rocky Mountain & Pacific Co. and subsidiaries report a net loss of $84,595 in 1932 after taxes, interest, depreciation, depletion and other charges, compared with a net profit of $15,041 in 1931, or $1.61 a share on 9,319 shares of $100-par 5-per cent preferred stock.

Sloss-Sheffield Steel & Iron Co. reports for 1932 a net loss of $956,312 after interest, depreciation, depletion, taxes and other charges. This compares with a net profit of $79,342 in 1931, equal to $1.18 a share on 67,000 shares of $100-par 7-per cent preferred shares.

United States Distributing Corporation and subsidiaries report a net profit of $375,684 in 1932 after depreciation, depletion, interest, taxes, subsidiary preferred dividends and other charges, equal to $3.70 a share on 101,457 7-per cent preferred shares, against $355,590, or $3.49 per preferred share, in 1931.

Pardee Anthracite Mines Sold

With the resumption of operations on April 10, the anthracite mines of Pardee Bros. & Co., near Hazleton, Pa., went into the hands of a new group of owners, which includes Boyd C. Osler, general manager. Properties figuring in the transfer were: Beaver Brook mine, Beaver Brook, Pa., and the Drifton and Lattimer operations at Lattimer Mines, Pa.

Industrial Notes

THE NEW YORK CITY OFFICE of the John A. Roebling's Sons Rope Co. of New York, has been removed to 107 Liberty St.

SIMPLEX WIRE & CABLE CO. has removed its New York City office to 420 Lexington Ave.

R. E. HELLMUND, formerly electrical engineer, was appointed chief engineer for the Westinghouse Electric & Mfg. Co. last month. Mr. Hellmund joined the organization in 1907. H. W. COPE, formerly assistant director of engineering, has been appointed assistant to the vice-president in charge of engineering. Mr. Cope joined Westinghouse in 1898.

COPPUS ENGINEERING CORPORATION, Worcester, Mass., has appointed the Charles B. Scott Co., Scranton, Pa., as anthracite representatives for the company's mine ventilating blowers.

ROY C. MUIR, for three years assistant to the vice-president in charge of engineering, has been appointed manager of the engineering department of the General Electric Co. Mr. Muir will have charge of design engineering in all the company's plants, the works laboratories and the general engineering laboratory at Schenectady, N. Y.

REPUBLIC STEEL CORPORATION, Youngstown, Ohio, has removed its Dallas (Texas) office to 2322 Gulf Building, Houston, Texas. R. E. LANIER, district sales manager at Dallas, and his present staff will be in charge of the new office.

Plan "Engineering Week"

Plans for a large conference of engineers at Chicago, during Engineering Week, June 25-30, sponsored by the Century of Progress Exposition, are making excellent progress. Mining engineers will be particularly active during the week at sessions of the A.I.M.E. and at the exhibits of the World's Fair and the Sixth Midwest Engineering and Power Exposition at the Coliseum. The Fuels Division of the A.S.M.E will have a program of particular interest to the coal industry. Some twenty of the national engineering societies also will participate with sectional and national meetings.

Personal Notes

JAMES ARKWRIGHT, formerly with the Valley Camp Coal Co., Cleveland, Ohio, has been elected president of the Arkwright Coal Co., operating the Mona mine, near Morgantown, W. Va. He succeeds the late Stephen Arkwright.

R. TEMPLETON SMITH, vice-president, Pittsburgh Coal Co., Pittsburgh, Pa., has been elected chairman of the Western Pennsylvania Coal Traffic Bureau.

J. P. WILLIAMS, JR., president, Koppers Coal & Transportation Co., Pittsburgh, Pa., and W. M. RITTER, Washington, D. C., a member of the executive committee of Appalachian Coals, Inc., will be honor guests at the Chamber of Commerce of the United States dinner, to be held May 4 during the course of the 21st annual meeting of that body in Washington, D. C.

Track Standards Approved

A revised standard covering frogs, switches and turnouts for coal-mine tracks has been approved by the American Standards Association as American Recommended Practice. The revised standard is a part of the project covering coal-mine tracks, signals and switches, and replaces the former standards approved in 1927. Material for the revisions was gathered by a subcommittee of the American Mining Congress, under the chairmanship of R. L. Ireland, Jr., vice-president, Hanna Coal Co.

Coming Meetings

American Mining Congress; annual convention and exposition, May 8-11, Pittsburgh, Pa.

Mine Inspectors' Institute of America; annual meeting, May 15 and 16, William Penn Hotel, Pittsburgh, Pa.

Indiana Coal Producers' Association; annual meeting, June 6, Terre Haute, Ind.

National Coal Association; annual meeting, June 15-17, Chicago; annual dinner, June 16.

American Society for Testing Materials; annual meeting, June 26-30, Chicago.

Ohio Coal Conference; annual meeting, July 10-12, Cedar Point, Ohio.

WHAT'S NEW
IN COAL-MINING EQUIPMENT

Spike Puller

Bowdil Co., Bowdil, Ohio, offers the Bowdil spike puller with detachable claws to reduce the time consumed in this phase of trackwork. Advantages claimed for the detachable-claw construction are: easy removal for dressing and special provisions for removing spikes without bending them. High-grade steel is

Bowdil Spike Puller

used in making the claws, the company says, and with extra claws on hand there is no time lost in replacement. Claws are available also for each size of spike used.

Testing Ammeter

For measuring current in cables and other conductors where it is not feasible to interrupt the circuit to connect the instrument in the line, the Columbia Electric Mfg. Co., Cleveland, Ohio, offers the "Tong-Test" ammeter. This instrument is of the split electromagnet type, and, according to the company, has no electrical windings to burn out. No connection in the circuit is required, it is stated, inasmuch as the magnetic flux produced by the current operates the meter. The meter may be applied to cables up to 1⅝ in. in diameter, and weighs 2¼ lb. It will operate on both alternating and direct current, according to the manufacturer, and interchangeable elements enable it to measure current up to 400 amp. No shunts or ratio transformers are needed, it is said.

New Motor Control

Cutler-Hammer, Inc., announces a new across-the-line-type automatic d.c. controller employing an adjustable timing device to allow the field current of the motor to build up to full strength before the armature circuit is closed. Thus, it is claimed, the motor is protected by cutting down the current

Cutler-Hammer Across-the-Line Starter

inrush approximately 50 per cent. The starter was designed for use on shaker conveyors, but is recommended by the company for all d.c. motors of 15 hp. and less. Elimination of accelerating contactors and mechanical or dashpot timing equipment is said to cut maintenance to a low figure. The starter is mounted in a dust-tight casing arranged for easy inspection and adjustment.

Motor Reduction Unit

Allis-Chalmers Mfg. Co., Milwaukee, Wis., offers a motor-reduction unit for use where low-speed drives are required. The unit consists of a standard frame motor mounted directly on the gear reducer housing to form a compact unit. Standard take-off speeds vary from 3.02 to 380 r.p.m., with still lower speeds available. Using 1,750 r.p.m., a low take-off speed of 6.08 r.p.m. can be had. Ball and roller bearings, helical gears, continuous automatic lubrication, ease of repair and replacement, and adaptability to changes in ratios are stressed by the company. Standard units are arranged for floor mounting, but models are available for wall, ceiling or vertical mounting. Any desired type of motor can be supplied, including standard squirrel-cage, wound-rotor, inclosed fan-cooled, explosion-proof or direct-current.

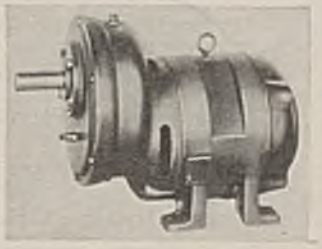
Allis-Chalmers Motor Reduction Unit

Portable Instruments

A new line of portable a.c. and d.c. instruments is offered by the Roller-Smith Co., New York, under the trade name "Steel-Six." The line comprises a.c. and d.c. ammeters, milliammeters and voltmeters; d.c. millivoltmeters and volt-ammeters; and a.c. single and polyphase wattmeters, frequency meters and power-factor meters. Features stressed by the company are: sturdy steel cases which shield the mechanism against external magnetic influence; unusually long scales (5⅞ in.); high accuracy; well-lighted open dials; fusing, when desired; and compactness (cases are approximately 6 in. square).

Motorized Reducer

D. O. James Mfg. Co., Chicago, announces a new power-transmission unit made up of a speed reducer and motor combined into a single housing. These units are available in a wide range of ratios and speeds



Motorized Speed Reducer

from ½ to 20 hp. Continuous-tooth herringbone gears are mounted on anti-friction bearings and run in an oil bath. Compactness, great strength and high efficiency are stressed by the company.

Walking Dragline

Bucyrus-Monighan Co., South Milwaukee, Wis., announces a new 10-yd. walking dragline with a 160-ft. boom. Designated as the 10-W machine, this dragline is said to combine the advantages of long reach and big bucket capacity with those of walking traction over soft or muddy ground, rough footing, or surfaces presenting obstructions. The machine, while excavating, stands on a circular base with the walking shoes raised, and the direction of travel is changed by revolving the swinging platform to which the walking shoes are attached, thus, it is said, enabling the machine to take a zigzag path in following the work, sidestep obstructions, walk away from a slide or mud hole, or dig excavations wider than the boom reach.

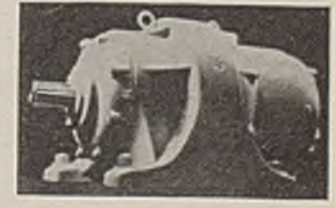
Conveyor Belt

Manhattan Rubber Mfg. division of Raybestos-Manhattan, Inc., Passaic, N. J., is now marketing the "Condor" conveyor belt, said to be featured by increased flexibility, due chiefly to the use of a newly designed, interlaced cord-duck carcass bonded through and through with a special rubber compound. Advantages claimed for the belt are: extreme flexibility and perfect troughing, even with thick, narrow belts; reduced stretch; longer life, due to complete bonding; inseparable adhesion between interlocking plies; inseparable wear-resisting covers; and high resistance to puncture.

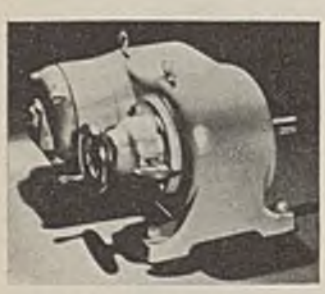
Motors

U. S. Electrical Mfg. Co., Los Angeles, Calif., announces the "Syncrogear" motor in speeds from 2 to 10,000 r.p.m. According to the company, the conventional practice of mounting a train of gears on the end of a standard motor frame has been supplanted with a self-contained, single-base geared transmission on a heavy

U. S. "Syncrogear" Motor



pedestal base to withstand the torsional stresses inherent in geared, high-torque reduction. This construction, it is said, minimizes cantilever stresses by a short train structure, bringing all torsional stresses to a center where the pyramidal gear base supports the entire unit. Other advantages pointed out by the company are: normalizing of cast-iron parts to insure gear alignment; removal of the high-speed gears from the oil reservoir to eliminate resistance, heat and foaming; asbestos insulation of the motor



U. S. "Varidrive" Motor

and electrical impregnation with "Asbestosite."

Another new product of the company is the "Varidrive" motor with microspeed control, said to give any and all speeds within 1 r.p.m. over a wide range, instantly controllable at the will of the operative while the driven machinery is in motion. The drive consists of a constant-speed squirrel-cage motor and two dual disks connected with a "Varibelt." Either local or remote control is possible, according to the company.

Splashproof Motor

Ability to prevent the entrance of water splashed under heavy pressure from any angle, while retaining adequate ventilation, and the same dimensions as standard motors is claimed by the Louis Allis Co., Milwaukee, Wis., for its new splashproof motor. This protection is afforded by a double baffle in an elliptical air passage in each end bell. At the same time, the company says, free air passage is permitted,

Testing Splashproof Motor

Louis Allis Motorized Speed Reducer

while water splashed into the bottom of the chambers is trapped and drained off. A further feature is a shaft guard to break the force of a stream of water directed along the shaft extension and prevent entrance of the water into the bearing chamber.

Louis Allis Co. also offers a new line of motorized speed reducers in ratings from ¾ to 75 hp. at output speeds varying from 4 to 400 r.p.m. Motor and speed reducer are combined in a single unit. Efficiencies as high as 97 per cent are claimed, and the company stresses high-grade precision gears and pinions, oversized ball bearings, and other construction refinements. Styles are available to accommodate almost any type of motor.

Renewable Lip Dipper

American Manganese Steel Co., Chicago Heights, Ill., offers the "Amsco" manganese steel renewable-lip one-piece power shovel dipper in sizes from ⅜ up to 4 cu.yd. Use of this type of dipper, according to the company, results in a substantial saving in weight, with attendant reduction in power consumption, increase in yardage and reduced wear. The possibility of renewing digging fronts in the field without the use of riveted connections is a further advantage stressed by the company, and this feature also permits different types of lips to be quickly and easily installed to meet changes in the type of material handled.

Showing Installation of Renewable Lip

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