COAL AGE

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Half Way Is Not Enough

THE VIGOR with which the various groups named by the special stabilization committee of the National Coal Association have been following through on the drive for the organization of district selling agencies in their respective fields is the most heartening manifestation of cooperative activity in the bituminous industry in recent years. Leadership is finding both a voice and an arena for the exercise of its talents.

IN AN INDUSTRY so indoctrinated with the defeatist theory that the men of that industry could never be brought to agree voluntarily among themselves on any joint policy or program, this alone is no mean achievement. But its practical significance must be measured by the extent to which it spurs a united industry to still greater efforts in the direction of rehabilitation.

WERE IT POSSIBLE for the district selling agency to accomplish all the results claimed for it by its most enthusiastic proponents, it would nevertheless still fall far short of being the complete answer to the manifold problems of the bituminous coal industry. Moreover, as was pointed out last month, the success of this plan is inextricably bound up with the larger requirements of stabilization.

IN ADDITION to being a first step toward ultimate physical consolidations, the district selling agency plan as outlined in the report of the National committee also offers a more immediate approach to certain phases of the problems of production control and of sounder merchandising. But it presents no direct solution for such important problems as stabilized industrial relations, mechanization, coordinated research, and safety.

THESE PROBLEMS cannot be ignored. They are major objectives which must be won if and before the goal of stabilization is finally reached. While it would be unfair to ask that the industry stage a revolution over night, some of these problems press with an immediacy fully as urgent as that involved in the consideration of proposals to end the present destructive and chaotic marketing.

ALTHOUGH it is a question which many operators would prefer to pass over in silence, stabilized industrial relations ranks high in this group. Few producers are happy over the existing situation and its implications. The situation is not only dangerous in and of itself but, unless corrected, it threatens the success of other efforts toward stabilization—including the district selling agency plan.

WITHOUT MORE STABILITY in industrial relations than now exists, the way remains open for the marginal producer and for the unsafe operator to wreck both fair prices and decent wages by taking advantage of the brute necessities of men fighting starvation. Cold, unemotional business judgment, therefore, should convince the industry, now that the start has been so auspiciously made, that half way to stabilization is not enough.

DRAINAGE TUNNEL

+ Cuts Costs at Honey Brook

By CHARLES F. HUBER

Chairman of Board
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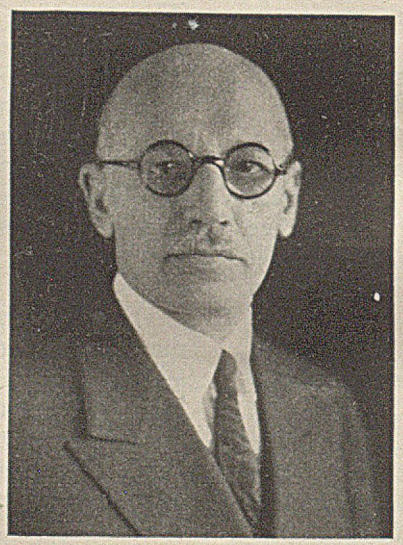
THE lands of the Glen Alden Coal Co. in the Lehigh field, which were owned and operated by the Lehigh & Wilkes-Barre Coal Co. up to Jan. 1, 1930, have been worked for more than 70 years. The mining is largely on a heavy pitch, and in the past 45 years considerable areas of the Mammoth Vein have been removed by the stripping method. This method, combined with second mining, resulted in a large inflow of water, so that, notwithstanding facilities for pumping 15,000 gal. per min. to the surface, there were periods when it was necessary to dam back the inflow and, at times, suspend operations.

It, therefore, became a question of providing more pumping capacity or driving a drainage tunnel, which would eliminate 90 per cent of the pumping and avoid additional investment in pumping facilities. When it was found that this could be done for about $700,000, and that the saving effected in labor, material and power would amortize the expenditure, with interest, over a period of fifteen years, the tunnel plan was adopted and preliminary work started in the summer of 1927 (Fig. 2).

A line of levels was run from a point on the surface at the mine opening along the Catawissa Creek, into which the proposed tunnel was to discharge. The distance was over four miles and the work had to be done with great care, due to the slight gradient on the tunnel. Tie runs showed a variation of only 0.003 ft. and the relative elevation of the two points was thus accurately established.



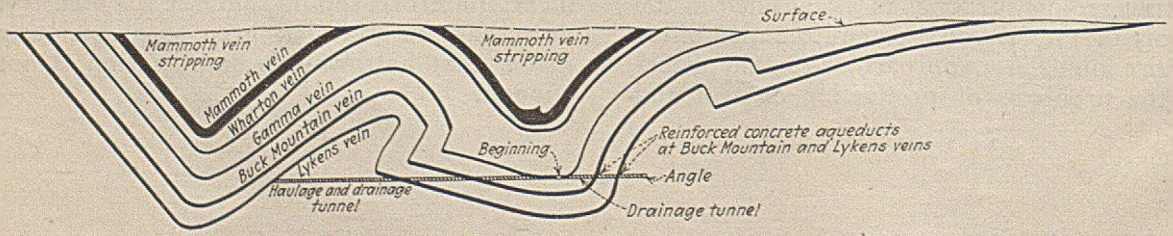
Charles F. Huber

The elevations in the mine were checked with those previously established by the taking of vertical angles, with elevations determined with a Wye level through a manway pitching from 5 to 20 deg. and along a gangway route to the point at which the tunnel was to leave the mine. The length of the loop was 2.6 miles and the variation was found not to exceed 0.15 ft., which was good for the conditions and sufficiently accurate for the results to be achieved.

The surveys underground were then checked, making quite sure that the inside starting point of the tunnel would be accurately located with reference to a fixed point on the outside. This accomplished, surveys were made from this point to the point on Catawissa Creek where the tunnel was to discharge—the length of the loop being approximately 8½ miles. The foregoing determined the length of the tunnel and open cut at 3.2 miles and the gradient at 0.17 per cent.

While the elevations were being established and the surveys made, details of the actual work of driving the tunnel were being planned. It was decided that the cross-section should be approximately 8x12 ft. as a size convenient for mechanical loading and giving the width and height for a

Fig. 1—Cross-Section of Coal Measures at Intake End of Drainage Tunnel, Audenried Colliery



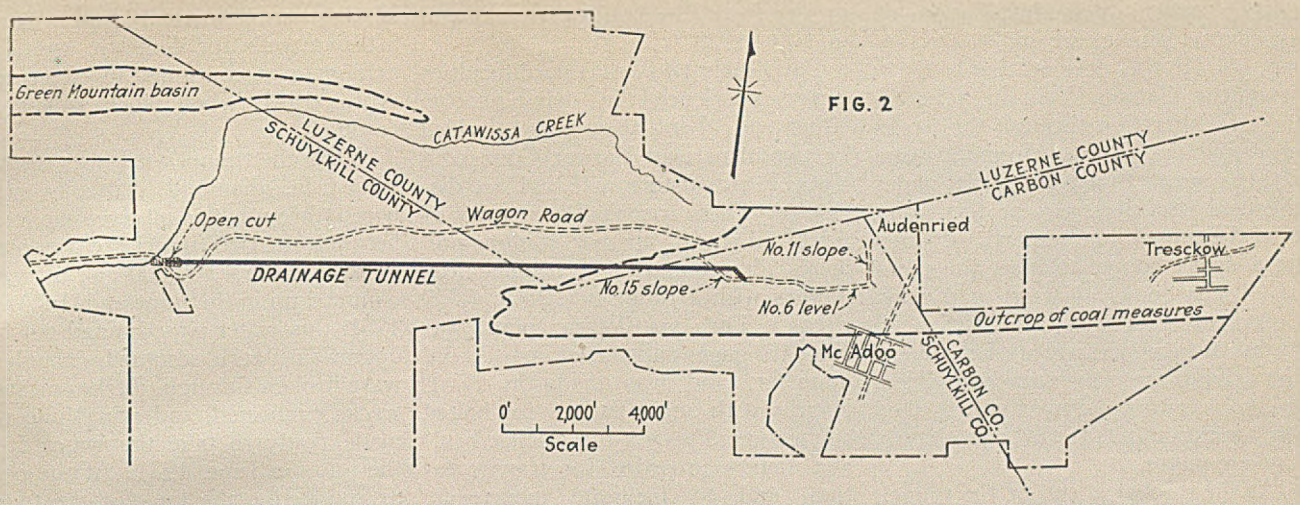


FIG. 2

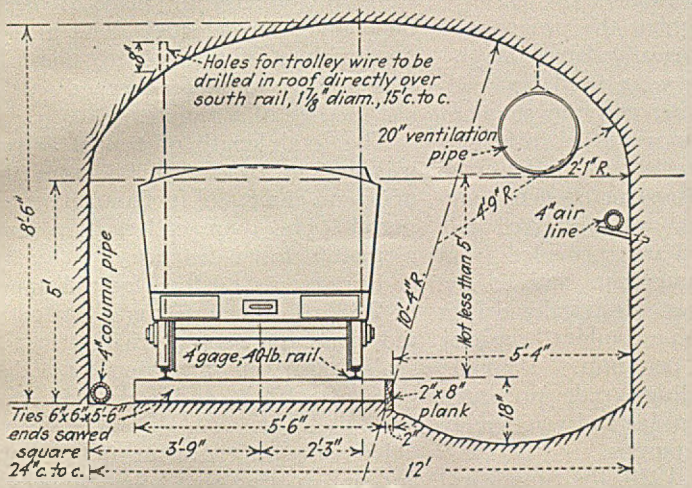


FIG. 3

Fig. 2—Map of Drainage Tunnel

Fig. 3—Cross-Section of Tunnel in Solid Rock

Fig. 4—Method of Timbering Where Concreting May Be Necessary Later

Fig. 5—Cross-Section of Aqueduct Crossing Lykens Vein

Fig. 6—One of Two Big Floor Beams That Carry Aqueduct Through Lykens Vein

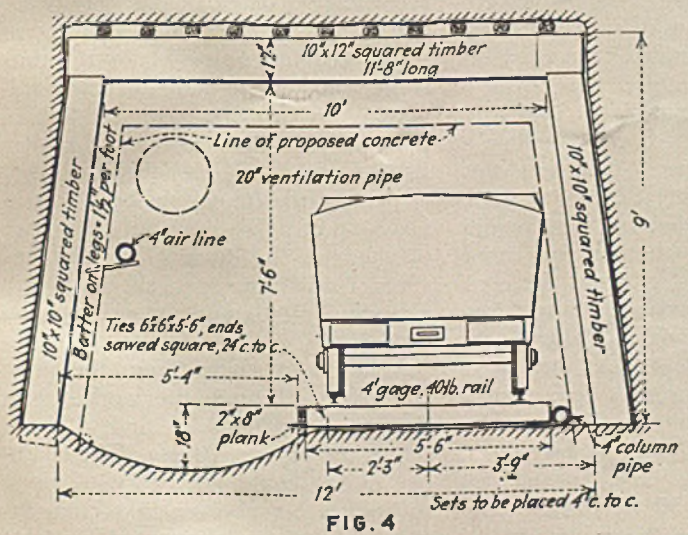


FIG. 4

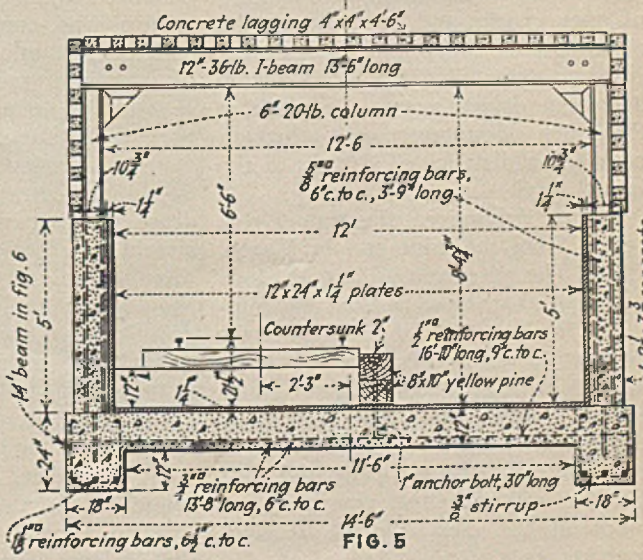


FIG. 5

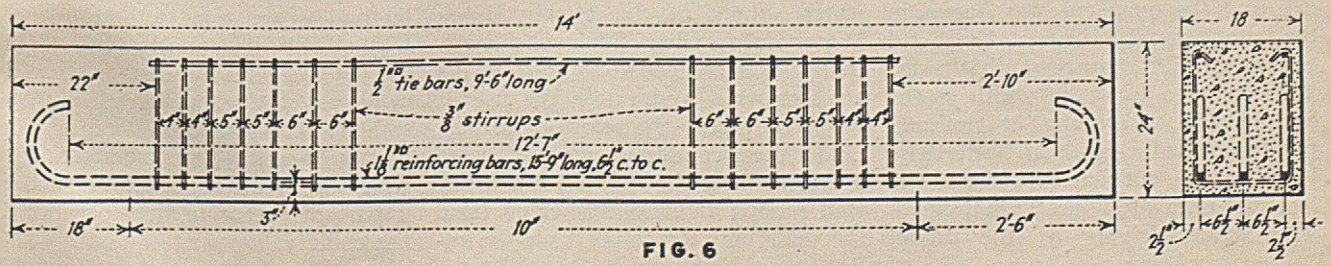


FIG. 6

proper water ditch, installation of ventilation piping, air and water piping, etc. It was decided also to drive from the Gamma Vein in a northwesterly direction through the workings in the Buck Mountain and Lykens seams to a point 50 ft. under the coal measures and at this point turn the tunnel in a westerly direction on a direct course to meet the point of discharge in Catawissa Creek. Compressed air was to be furnished by an air compressor at the colliery for driving from the mine end. Electricity was to be similarly furnished for operation of the fan and electric haulage motor.

At the discharge end of the tunnel, it was decided to make an open cut until the rock was of a height and character to permit starting the tunnel. This involved excavating through a public road which was later replaced by providing a reinforced concrete duct on the line and grade of the tunnel over which the road fill could be made and through which the excavated rock could be transported until the work was completed. In order to provide power for the operation of air compressor, ventilation fan, and haulage motor it was decided to install equipment near the open cut and run an electric transmission line from the colliery to the point of installation—a distance of about four miles.

In order to facilitate the handling of men, rock, and supplies to the mine end of the tunnel, it was decided to extend No. 15 Slope, which had been driven across the pitch in the Buck Mountain Seam, through rock for a distance of 320 ft. to the tunnel level.

Actual driving of the tunnel was begun from the mine end in March, 1928. The extension of No. 15 slope was started at the same time and completed three months later. The shorter connection which this provided to the surface permitted a survey two miles less in length than that previously made. This survey was made and elevations likewise were checked, thus further reducing the possibility of error in the establishment of lines and grades.

At the creek end the work of excavating the open cut was begun in the latter part of February, 1928, and completed in August of that year. This cut was 12 ft. in width at the bottom and, beginning at nothing, finally reached a depth of 65 ft. The length of the cut was 796 ft. and the material excavated was 53,800 cu.yd. The actual driving of the tunnel proper from the creek end was begun in July, 1928.

For nearly two years no difficulties were experienced in driving from either end. Ventilation was provided by two American Blower Co. No. 8 Type P exhausters with upblast discharge. These each had a capacity of 3,500 cu.ft. of air per minute and were driven with variable-speed motors with a range of 500 to 1,750 r.p.m. The ventilation pipe was No. 16 gage galvanized, of 20 in. diameter, and was made in 17-ft. lengths with angle flanges for bolted connection. Two six-ton electric haulage motors provided for transportation, and to facilitate movement; turnouts were established at 1,000-ft. intervals throughout the progress of the work. Electrically driven Myers-Whaley shovels were used for loading. At the mine end the standard colliery mine car was used to receive the excavated rock, and at the creek end a specially constructed steel dump car was used. Compressed air at the mine end was provided from the colliery equipment, and at the creek end by two electrically driven compressors with a combined capacity of 750 cu.ft. per min. Pumping on the descending grade presented no serious difficulties and was readily done with small pumps.

In February, 1930, the tunnel had been driven from the mine end for a distance of 7,651 ft. At this point a fissure was encountered which resulted in an inflow of nearly 800 gal. of water per minute, a quantity far beyond the capacity of the pumps in use. The tunnel rapidly filled with water to the level of the overflow at the mine entrance. Question then arose as to whether $25,000 or more should be expended for new pumps, piping, etc., or whether the tunnel should be completed from the creek end. The two ends of the tunnel were then 3,300 ft. apart and the conclusion was to adopt the alternative, even though it meant a few months' delay in the completion of the work.

In December, 1930, the face of the tunnel from the creek portal had reached a point 50 ft. distant from that driven from the mine end. A severe drought had so depleted the water supply of the Honey Brook Water Co. (a Glen Alden subsidiary) that it was compelled to start up its artesian wells and ration the use of water to supply the territory served. Under these conditions, it was decided not to connect the tunnels, but to install pumps and use the water from the mine end for colliery supply, reserving the entire output of the artesian wells for domestic use. This arrangement continued in effect until April, 1931, when work was again resumed.

While the tunnel work was stopped two 6-in. diamond drillholes were bored through the intervening strata between the two tunnel faces in order to release the 4,500,000 gal. of water dammed up in the mine end. In April, 1931, this water was drained out and operations were resumed. Headings were broken through, ditches cleaned, tracks connected, and everything was made ready to take the water from the mine in June, 1931. At the point of connection the lines of the tunnel were so close that the place of meeting cannot be detected. The grades met with a difference of one-half inch and the meridian checked within one-quarter of a minute.

The total length of tunnel driven was 16,150 ft.—7,651 ft. from the mine end and 8,499 ft. from the creek portal. The mine end was in conglomerate for a distance of 5,265 ft. and in green sandstone for a distance of 2,386 ft. The creek end started in red shale and was alternately in red shale and green sandstone for a distance of 8,470 ft. and in conglomerate for only 29 ft.

Knowing the character of the strata and anticipating that some timbering might be required—particularly in the red shale—provision was made accordingly. In all, 102 sets were erected, with legs and collars so placed that if concreting of the timbered sections is later deemed advisable, the concrete can be put to place without removal of the timber sets (Fig. 4). The 40-lb. track used in driving the tunnel has been left in place, with the ends of the ties planked on the ditch side. This insures ready access at all times for cleaning of falls and timbering when necessary.

Where the tunnel from the mine end passes through the workings in the Buck Mountain and Lykens seams the pitch is 70 deg. The chamber pillars could not be relied upon to hold water or even to remain intact. Therefore, reinforced concrete flumes were built at these points, extending from top to bottom rock, with steel roof supports (Figs. 5 and 6). In this way the danger of settlement and caving has been eliminated and the necessary protection afforded to the waterway, the maintenance of which in working order is such an important factor in the operation of the colliery.

BRITISH WASHER + Installed at Montevallo

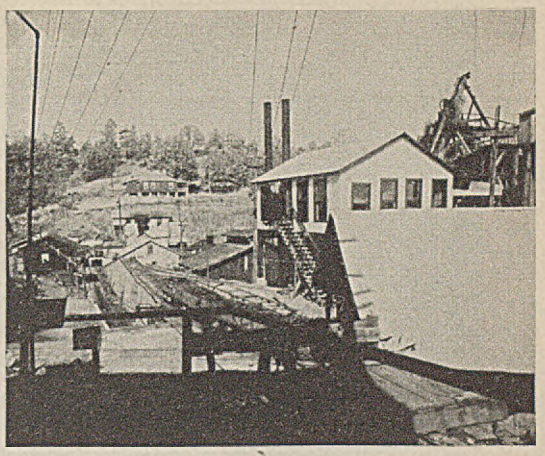


Fig. 1—The New Building Incloses Only the Upper Part of the Washer

LAST summer the first Norton automatic coal washer in the United States was placed in service at the Montevallo mine of the Montevallo Coal Mining Co., Aldrich, Ala. The washer, complete except for the drive motor, was purchased in England. Based on past washing experience beginning in 1904 and covering successive installations of three makes of jigs, the goal of the management in the installation of this new equipment was the washing of 4½x0-in. coal without presizing, so as to bring the ash in the 1x0-in. steam coal down to 9 per cent, with a loss of coal to the refuse of not over 10 per cent when washing at a gravity of 1.45. Actual experience since the installation of the washer has shown that the ash in the washed 1x0-in. coal averages slightly below 8 per cent, while the coal loss to the refuse is 6.6 per cent at 1.60 gravity, or 3.7 per cent at 1.45 gravity.

The Norton washer is a development of the Baum jig, and operates on the same principle; that is, the movement of the water in the various compartments is caused by air pressure on the surface of the water in respective communicating compartments. Features on this type of washer which are new in American coal cleaning are: an automatic device for the maintenance of a minimum depth of refuse bed in the washer by the opening and closing of the refuse gates; and an automatic stop-start control. The latter allows for quickly releasing the air pressure to arrest pulsation of the water when the feed to the washer ceases. Immediate release of the air pressure prevents any disturbance of the depth and character of the washing bed, so that proper separation of the coal and refuse begins immediately upon resumption of the feed, and this action automatically causes the air pressure to build up and resume the actuation of the water.

Fig. 2—Factory View of the Norton Washer, Looking Toward Outlet End

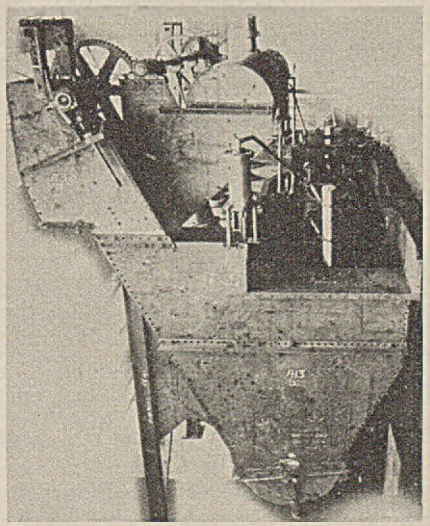
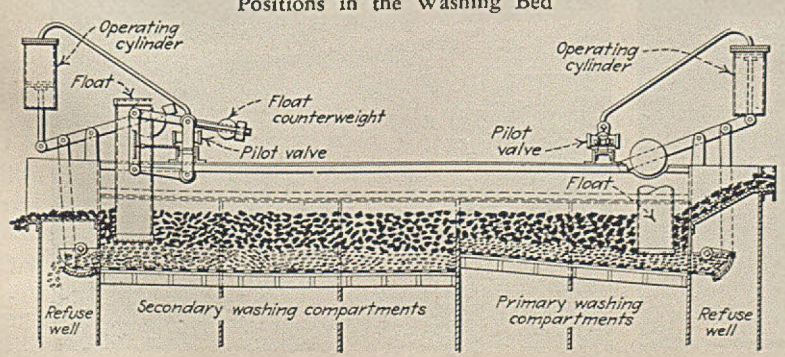


Fig. 3—Showing the Five Compartments of the Washer and Float Positions in the Washing Bed



A factory view of the washer, looking toward the outlet end, is shown in Fig. 2. The other photographs reproduced in this article were made at the Montevallo mine. Fig. 4 is a view showing the feed chute in the rear. At the left is the air receiver, which carries the air at a pressure of 2 lb. per sq.in. The receiver is connected to each of the five washing compartments through piston valves in which are incorporated the air release features. Fig. 6 shows the Norton (Tividale) slow-speed, radial blower, which is mounted back of the air receiver. In this blower, a rotating cylinder offset from the center of the case carries four plates or blades that slide in radial grooves. The blower, valve eccentrics, and refuse elevators are driven by a Westinghouse Type CW, 579-r.p.m., 2,300-volt, slip-ring motor, equipped with a magnetic controller.

The floats, shown in Figs. 3 and 4, have a stream-line section to minimize disturbance of the flow of water and coal. These floats move up and down in a narrow range in accordance with the pulsation of the water, but the counterbalance weight is adjusted so that the bottom of the float does not sink into the refuse bed. When the float rises to a certain limit, it actuates a valve, admitting air to an operating cylinder, which in turn opens the refuse gate. Lowering of the float when the bed returns to normal reverses the process of opening the refuse gate.

Automatic starting and stopping of the washer is effected by means of a

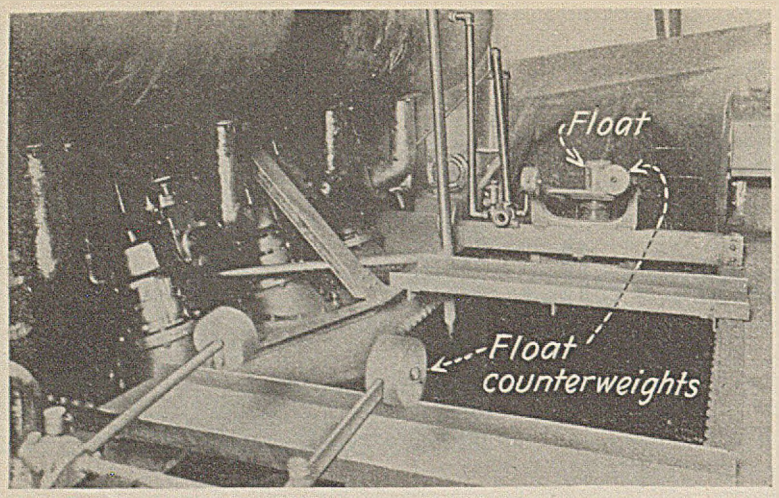


Fig. 4—Top View of the Washer, Looking Toward Feed End

metal paddle 4 in. wide, which hangs at the discharge end of the belt conveying the raw coal to the washer. The coal flowing off the end of the belt swings the paddle back from its normal vertical position. A pilot air valve connected to the paddle, through the medium of an operating cylinder, controls a large, butterfly-type, atmospheric relief valve on the receiver.

When the coal feed stops, the paddle drops to vertical position and actuates the butterfly valve so that the air pressure in the receiver is dropped to atmospheric. Building up the pressure upon resumption of the feed is completed in 2 or 3 seconds. A weighted pop valve on the top of the receiver is adjusted to keep the pressure within 2 lb. per sq.in. Experience at the Montevallo mine indicates that the pressure can be better regulated by opening a bleeder or blow-off valve to provide sufficient leakage to eliminate action of the pop valve in all but a few cases. Use of the bleeder valve has been found to result in fewer fluctuations in pressure.

A mechanical feature of the machine not often found in American practice is the arrangement for accomplishing take-up of the refuse elevator at the drive sprocket. The radial take-up, by which the elevator chain is tightened without changing the gear-center distance, is shown in Fig. 5.

Refuse elevator casings are not placed in water-separate compartments, but are installed in extensions of the water-box tank. Worm conveyors in the bottom of the water box are driven from the bottom sprockets of the refuse elevators, but can be removed without disturbing either the elevators or sprockets.

With the washing system formerly used at Montevallo, the reject to the refuse pile averaged 34.8 per cent of the total feed to the washer. The Norton system has reduced this reject to 22 per cent, in spite of the fact that the mining machine cuttings now are loaded, instead of being gobbed, as was the case when the old washers were in use. From bottom to top, the coal vein includes the following: bottom coal, 8 in.; middleman, 0 to 12 in.; clean hard coal, 26 in.; and drawslate, 8 to 10 in. A high percentage of the large refuse is flat.

Performance of the washer is shown in the accompanying table, a summary of a six-hour test made on July 2. On that date, the ash in the 1x0-in. steam coal averaged 8.45 per cent. Since then, washer adjustments have brought the ash down to slightly less than 8 per cent on the average. For almost two months prior to the preparation of this article, no operating adjustments were made.

The Norton washer was installed as a separate unit close by the old washing plant, so that the original 6-in., belt-driven, centrifugal, circulating pump could be retained. Only the equipment above the operating floor of the washer is housed. The building is shown at the right in Fig. 1. Net weight of the washer, including the blower, but not the motor and control, is approximately 40 tons.

Six-Hour Test on Norton Washer Working on 4½x0-In. Feed at Montevallo Mine, July 2, 1931

	Per Cent	Ash Content, Per Cent
4½x0-in. Washed Coal:		
4½x2-in. egg	100.0	6.12
Float at 1.40 specific gravity	98.2	5.45
Material between 1.40 and 1.60	1.5	19.85
Sink at 1.60	0.3	42.50
2x1-in. Nut	100.0	5.44
Float at 1.40	97.7	5.15
Material between 1.40 and 1.60	2.1	13.90
Sink at 1.60	0.2	51.50
1x0-in. Steam	100.0	8.45
Float at 1.40	89.8	5.40
Material between 1.40 and 1.60	6.0	22.40
Sink at 1.60	4.2	53.80
Washer Reject:		
1-in. plus, float at 1.40	0.2	.....
1x0-in., float at 1.40	3.5	.....
1-in. plus, material between 1.40 and 1.60	0.6	.....
1x0-in., material between 1.40 and 1.60	2.3	.....
1-in. plus, sink at 1.60	41.5	.....
1x0-in., sink, at 1.60	51.9	.....

Coal from the Montevallo mine has commanded a top price in the domestic market for many years. Installation of this modern washery keeps the mine in the front rank of those employing up-to-date preparation methods.

Fig. 5—Radial Take-Up Guide at the Top of the Refuse Conveyor. In the foreground Is the Raw-Coal Belt Feeding the Washer

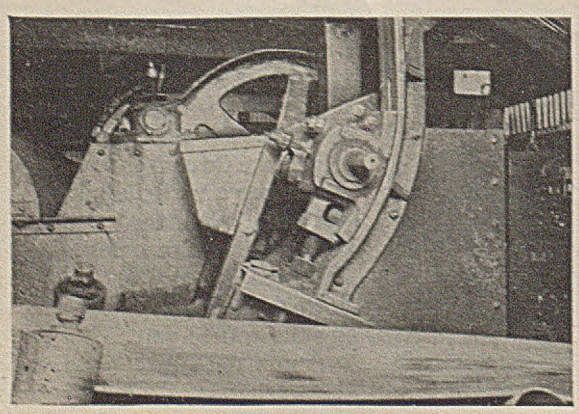
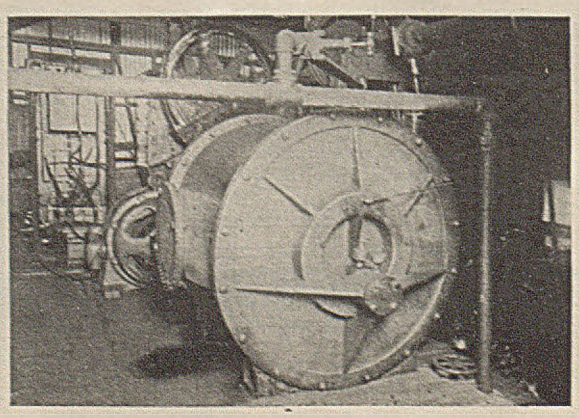


Fig. 6—Blower Mounted Back of the Air Receiver. The Latter Carries the Air at a Pressure of 2 Lb. Per Sq.In.



FOURTH OF A SERIES OF ARTICLES ON MECHANICAL LOADING METHODS

COST ACCOUNTING + For Mechanized Operations

DAILY TIME SHEET

SECTION No. DATE

Check No.	Name	Occupation	Hours	Rate	Amount
		Loader Operator			
		Operator Helper			
		Cutting Mach. Operator			
		Cutting Mach. Helper			
		Driller			
		Drill Helper			
		Motorman			
		Triprider			
		Trackman			
		Track Helper			
		Timberman			
		Faceman			

Foreman _____

Fig. 1—The Section Foreman Figures Labor Cost

By K. E. CAINE

Mining Engineer
Joy Manufacturing Co.

TO attempt the operation of a mechanized mine without keeping accurate cost and production records is comparable to an endeavor to steer a ship without a rudder. In both cases there is motion, but no guarantee of arrival at destination. Correct compilation of cost data will indicate many operating losses. By analytical comparison of the tabulations, mine foremen and superintendents are able to direct attack on expensive details and thus improve the performance of high-cost units. These comparison studies are imperative, especially at large-tonnage mines.

Necessity for this control has caused mine operators to develop new, daily accounting methods as an assurance of adequate and accurate cost figures for ready reference by the operating personnel. A great amount of thought has been given to this phase of the operation control at the successfully modernized properties.

Only informative and useful data should be given in the method used. Unnecessary detail should be omitted, for simplicity is essential. Complicated methods not only build high clerical costs but tend to obscure or completely submerge the more important figures. Therefore, all information should be given in only such detail as can be quickly and effectively grasped and used by the operating personnel.

Complicated and sometimes incorrect methods are too frequently developed when loading machines are first installed. Then, experience is necessarily limited or wholly lacking. Having no practical value itself, needless data, by continuous tabulation, put pertinent figures in a false light, as being red tape, along with the data which have no value. In consequence, the temptation is strong to abolish the keeping of all records. If this temptation is yielded to, even partial coordination of the installation is impossible. That is why it is necessary to develop a practical system at the very start.

The wide territorial area of mechanical loading practice makes impossible in many cases the study of methods used by other companies. Nor is it possible at once to make up a complete and final accounting system applicable to existing local conditions for the mine under consideration; but forms carrying the fundamental points can be tried and enlarged to meet known requirements.

Common practice at most hand-loading operations is to keep the record of labor-hours worked in standard time books. These records, entered by the inside foreman, are sent to the office daily. Time worked by each individual is then posted on office records and the foreman's book is returned. This system could be used with mechanized loading, but a much simpler and more accurate method has been developed.

The form shown in Fig. 1 has proved itself practicable, simple, and effective in keeping time records of labor-hours at several mechanized operations. They are filled out daily and at the end of the shift delivered to the mine foreman, who in turn gives them to the superintendent or chief clerk for posting.

Advantages resulting from the use of this time sheet as compared to the time book are many. Individual daily sheets tend to increase the primary accuracy of the record, for the section foreman knows that no changes can be made after daily posting and totals are reached. The make-up of the sheet is standard for all sections, simplifying the posting by the mine clerk and lessening chances for error. The sheet also allows the mine foreman or superintendent to check at a glance, and with an assurance of accuracy, the number of men in each mechanical section, as the sheet is received directly from the section foreman.

As a rule, it has not been found good practice to place operating data on the time sheet. The natural tendency of a section foreman, if he has had a bad day, is to overemphasize certain operating delays in such manner as to "alibi" himself or his crew, and thus obscure the accuracy of results if given the opportunity. Be sure to separate labor hours, or actual costs, from mechanical-unit operating time and delays.

A good policy also is to require the face foreman to turn in a daily report of all operating interruptions in his section, so that the mine foreman may know from day to day the cause of any loss in tonnage that may be traceable

to repeatedly occurring or unusual delays. This not only helps the mine foreman in his effort to keep in close touch with and follow up causes of such losses but also assists the face foreman in keeping a close tab on all such costly maladjustments in his territory. The ability of a face foreman should be measured in terms of continuous operation of his equipment.

In Fig. 5, a daily operating report, a form which curbs time losses, there is one item which should be especially noted. This reads "Cost Delays @ ——— per minute ———." The value of time lost can be impressed more emphatically on the face foreman when expressed in actual dollars and cents than when presented in operating minutes. This is particularly true in newly mechanized operations. The cost per operating minute can be computed for any section by dividing the total labor cost by the total minutes of shift time. This figure varies from 10c. to 20c. per minute, depending on size of crews and length of shift worked, but an average figure is adequate for quick reference. Thus, actual figures are shown for each operating shift.

Further good practice is to keep a monthly record of operating delays per machine unit, on a single report sheet. This should be compiled to show the delays today and to date. A direct comparison of the operating delays on the various sections will show whether the causes for loss of tonnage are general for all machines or whether they are of an individual character.

Supply and maintenance expenditures naturally have an important bearing upon production cost. Close consideration must be given these items, continually, if they are to be kept at a minimum. This can be accomplished only by recording these expenses for each section and for each machine. Data of this character must be tabulated to give a direct comparison between the several units.

It has been the custom at most hand-loading mines to charge off the cost of all materials as they are delivered to the mine. By so doing the supply cost for any one day may be inordinately high and for the following day practically nil. Supply and maintenance costs computed in this manner have no current control value to the operating department; they merely reflect expenses over a long period of time. Even then, their value is doubtful, for the money has been spent long before the average records are available. Data for maintenance and supply costs must be computed as the material is actually used if it is to be of any direct value.

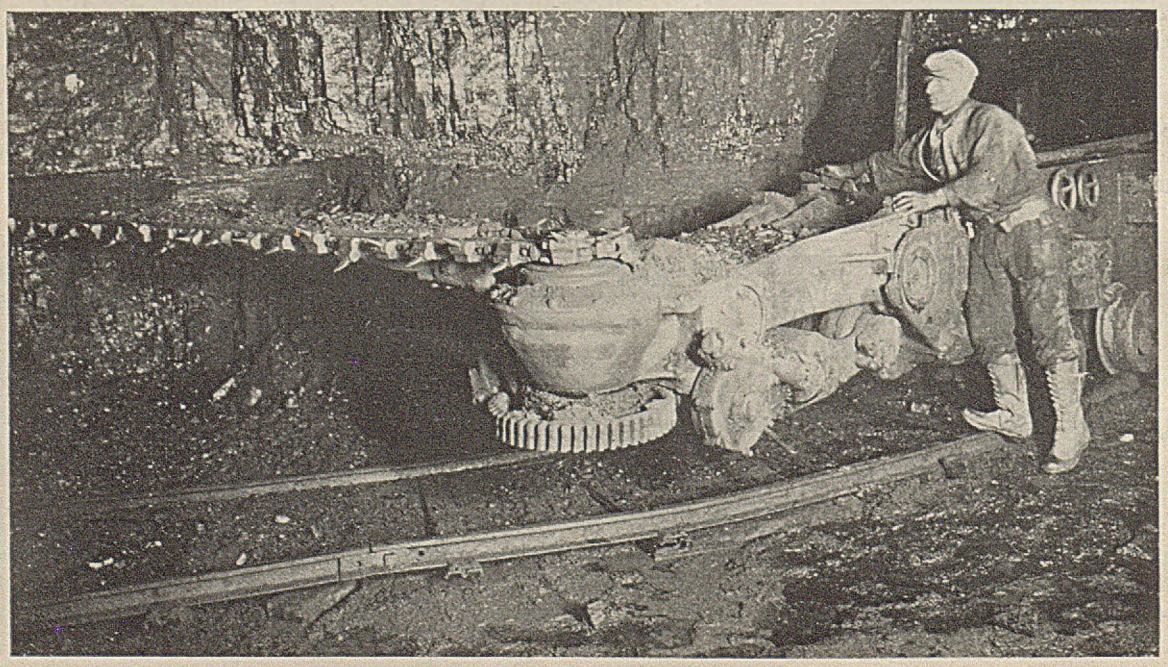
Materials should not be issued from the supply house unless authorized on a written requisition. Fig. 3 illustrates a convenient form to use for this purpose. Standard supplies are charged to the section in which they are used, and repair parts are charged to the machine on which they are used. Supply clerks can make up summaries of the cost of the materials used in the various sections and on the various machines. This information can then be transferred to the main control records in the office.

Figures Should Count

Rightly so, Mr. Caine in this article on cost accounting of mechanized operations lays greatest emphasis on simplicity. He urges that every figure be made to count. There should be a minimum of divergence in form between the reports which carry the data to the master voucher and this voucher itself. Cost assembly should progress in a straight line from the initial operation to the last, and should be divorced absolutely from operating reports, which, too often are made to serve as alibis for the figures. Complicated set-ups too often cover items of no practical value which detour attention from the real factual data.

In order to compute individual machine maintenance costs, the master mechanic must turn in an allocation of the time worked by the repair men in his department on each machine. Labor utilized for lubricating the machinery should also be shown, as well as the quantity of oil or grease use. From the foregoing data it is simple to make up a daily machine maintenance report, such as is shown in Fig. 4.

This report gives cost comparisons for machines of similar types. A close study of this report by the master mechanic will indicate which of the machines are in need of overhauling. There always is a basic



DAILY TONNAGE, LABOR AND MATERIAL COST

Loading Machine Number	PRODUCTION Today Tons	Today Cars	Today Avg. Wt. per Car	To Date Tons	To Date Cars	To Date Avg. Wt. per Car	Total Man Days	OPERATING LABOR Today Amount	Today Per Ton	To Date Amount	To Date Per Ton	MAINTENANCE LABOR Today Amount	Today Per Ton	To Date Amount	To Date Per Ton	SUPPLIES Today Amount	Today Per Ton	To Date Amount	To Date Per Ton	TOTAL LABOR AND SUPPLIES Today Amount	Today Per Ton	To Date Amount	To Date Per Ton
1																							
2																							
9																							
10																							
TOTAL																							
Hand Prod.																							
Company Coal																							
TOTAL TO PARTING																							
Main Haulage																							
Main Bottom																							
Drainage																							
Ventilation																							
Wiring																							
Safety																							
TOTAL TO SURFACE																							
Hoisting																							
Pickers																							
R.R. Car Loading																							
Tipple (Other)																							
TOTAL TO R.R. CAR																							
Clerical																							
Engineering																							
Supervision																							
Power																							
TOTAL																							

Fig. 2—By Use of This Form Daily and Cumulative Mine Costs Are Recorded, Broken Down for Each Major Phase of Operation

MATERIAL REQUISITION

Section | Date | Foreman

Powder | Caps | Dummies

Props (length and quantity) | Ties | Switches | Misc.

Rails | Oil | Grease

Machine Bits

Repair Parts (give part No. and name, also mach on which will be used)

Amount Delivered and Charged Checked in Red Ink by Supply Clerk | Signed

Fig. 3—Materials Should Be Issued on Written Requisition

DAILY MACHINE MAINTENANCE REPORT

TYPE EQUIPMENT | DATE

Machine No.	Today Repair Parts	Today Repair Labor	Today Lubrication	To Date Repair Parts	To Date Repair Labor	To Date Lubrication	Cost per Ton to Date
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
TOTAL							

Fig. 4 — Vulnerable Points of Machine Maintenance Cost Are Exposed by This Report

DAILY OPERATING REPORT

DATE | SECTION No.

DELAYS	Min.
No. Cars	
Cars off Track	
Motor off Track	
Tight Coal	
No Coal	
Cable	
Power	
Mechanical	
TOTAL DELAYS	
Cost Delays @ per min.	
No. Cars Loaded	
No. Places Loaded	
No. Places Cut	

Remarks

Foreman _____

Fig. 5—What Price Time Delays

cause for any excessive cost. The certain knowledge as to which machines are showing high costs will constitute definite information as to the most vulnerable points where maintenance costs may be reduced.

Each section foreman should be notified of any shortages in the delivery of material that has been requisitioned. He should be advised when these shortages will be filled so he can make temporary arrangements to take care of the work to best advantage until the needed material arrives. If the section foreman is not notified, the production from his section may be seriously affected. Lack of this cooperation may also cause him to take a half-hearted interest in his work.

The most important compilation, however, is the report showing the daily tonnage, labor, and material cost on the various operating divisions. A representative form for this is shown in Fig. 2. The expenditure for operating labor, maintenance labor, and supplies is tabulated for each major phase of operation. Both daily and cumulative data are computed. Not only is the tonnage of each unit included but also the number of cars dumped and average car weight are shown. All of these figures are indispensable to the operating personnel in guiding working details.

In laying out a form of this type, it is best to make it as simple as possible by eliminating unnecessary details. It should show only general information. Details of any of the subdivisions are best shown on separate forms.

The tonnage record per machine, of course, is important, as is the total of man-hours of labor expended for each unit. The most necessary figure, however, is the cost per ton, as it determines the net realization from operation of the property. Many indicators of operating efficiency have been devised, such as tons per man day; but the best and simplest in any individual operation is the actual expenditure per ton of coal produced.

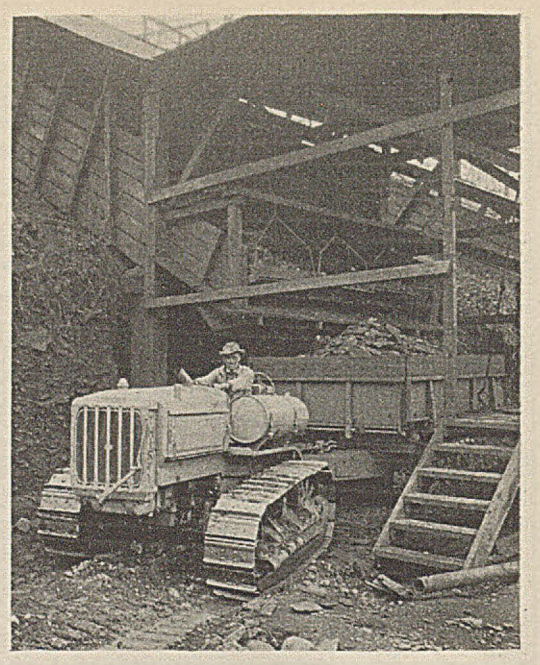
In so far as possible, the forms or reports used in the cost accounting system should work in with the actual bookkeeping methods employed. Otherwise, the clerical cost will be excessive. For example, the amount shown for repair parts on the daily machine maintenance report (Fig. 4) should be used with the general supply figures to compute the total supply cost shown in Fig. 2.

It is not the cost of any one day's operation which really counts but the average, or cost to date. This latter figure fixes the success or failure of the mechanization project. Cumulative figures must be shown on the general control sheet for this reason.

Clear, concise facts are essential for good management. The most important source of these facts is the cost accounting system. It is a weapon for defending the economic position of the company.

Earlier articles in this series dealt with preliminary considerations, haulage, and face preparation in mechanical loading. The fifth and last article, to appear in an early issue, will focus attention on loading-machine maintenance.

TRACTOR-TRAILER + For Rock Disposal At Pruden



Taking 8 to 10 Tons of Rock at a Trip

MINING thin coal usually involves the disposal of a large quantity of rock by reason of the necessity of providing height on the haulways. At a new mine of the Pruden Coal & Coke Co., Pruden, Tenn., opened in the Jellico coal, which is 30 to 42 in. thick and worked by the conveyor longwall method, the necessity for adequate refuse disposal equipment soon presented itself.

Although the haulage opening is a drift located at a higher elevation than the tipple, space is not available for dumping refuse close to the opening. The bulk of the refuse must be carried up the valley a distance of 1,000 ft. or more. This does not, however, involve carrying it to an elevation appreciably higher.

Observance of the popularity of tractors and wagon trailers with the contractors engaged in extensive grading operations led Charles A. Griffith, vice-president and general manager of the Pruden company, to consider this type of equipment for mine refuse disposal. The need for grading a mine yard, making a railroad fill, and grading a hillside road up to the mine opening, all three of which could utilize mine refuse, made it appear that the tractor-trailer was the logical equipment.

A "Caterpillar 30" tractor and a new 4-5 yd. Athey Truss Wheel trailer were purchased and put into use June 1, 1931. Since then, this equipment has handled all of the mine refuse. Some of this material has been hauled as far as 4,000 ft. Based on the present indications of wear as a means of estimating the maintenance of the tractor and trailer, the total cost of refuse disposal by this method should be around 5c. per ton of material hauled.

The investment in tractor and trailer is approximately $6,000. In the calculation of cost per ton this equipment was depreciated on a five-year basis. Repairs, interest, operative's wage, gasoline and oil were included in the cost. It was assumed that the tractor would work 150 days per year and handle 400 tons per day.

The trailer carries 8 to 10 tons and dumps its load on either side or at the end. The dumping is done by hydraulic cylinder and is controlled from the seat of the tractor. Ability of the tractor to pull the loaded trailer up steep grades and to carry the material over soft or rough ground adapts the equipment to making fills of almost any description.

A levee has been built along the creek, a fill made for a railroad siding below the tipple, a mine yard built, and a road made from the tipple up to the mine portal. Leveling of the mine yard was done by the same tractor pulling a road scraper.

Transfer of the refuse from mine cars to the trailer is effected by dumping directly into a hillside loading bin or chute which provides a considerable storage. The use of drop-bottom mine cars simplified the dumping arrangement. It was necessary only to provide above the upper end of the bin an open space between the rails of the trestle leading to the coal dump house.

On the Road It Made Between Loading Chute and Mine Yard

An End Dump While Filling the Mine Yard

RE-TREATMENT + Of Coal Middlings‡

By H. F. YANCEY

Northwest Experiment Station
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Seattle, Wash.

THE components of raw coal may be termed "coal," "bone," and "rock." If coal is attached to bone or rock in the same particle it may be considered as a "middling" particle, because it is intermediate in density between coal and rock. This intermediate density material is one of the factors which sometimes necessitates re-treatment or recleaning operations in a coal washing or cleaning plant. Usually, however, the washery operator is concerned not so much with true middlings as with accidental middlings. To him, middlings generally mean an incompletely separated mixture of good coal and refuse which contains too much good coal to throw away and too much impurity or refuse to add to the prepared product. Coal sludges of high-ash content, such as result from the clarification of washery water, hutches and screen-draw products from multiple-compartment jigs, and table middlings, are examples of the accidental type of middlings which sometimes require re-treatment at washeries.

A relationship exists between the quantities of such incompletely separated material or accidental middlings produced and the quantity of intermediate density material, or true middling, contained in the washery feed. The quantity of accidental middlings made in a well-operated plant depends somewhat upon the quantity of true middling found in the feed. If a relatively large quantity of intermediate density material is present in the feed, difficulty will be encountered in making a clear-cut separation between washed coal and refuse. Such difficulties become increasingly important when a separation between washed coal and refuse is attempted at points corresponding to low specific gravities.

The efficiency attainable with modern types of coal-washing and cleaning devices depends upon the specific gravity at which a separation is attempted between cleaned coal and refuse. Investigations conducted at the Northwest Experiment Station, U. S. Bureau of Mines, in cooperation with the University of Washington, and elsewhere have shown that the complexity of the washing operation and the refinements required for a two-product separation ordinarily increase as the specific gravity corresponding to the point of separation becomes lower. This is due both to the small differences in specific gravity between the material to be recovered and rejected and to a normal increase in the proportion of material near in specific gravity to the point of separation. The efficiency of a coal-washing device as here used is considered to represent the percentage of coal of a certain ash content in the feed which is recovered as a final product of the same ash content.

In general, carefully operated coal washers are able to effect a two-product separation—washed coal and refuse—at a point corresponding to 1.8 specific gravity or higher with efficiencies of 98 to 100 per cent even when treating bony coals. With the average Eastern and Middle Western coals, efficiencies of this order can be attained at 1.7 specific gravity. Separations at a point corresponding to 1.6 specific gravity can usually be made with an efficiency of at least 95 per cent if the size range treated is not too great, and up to about 98 per cent with a moderate amount of re-treatment.

Below 1.60 specific gravity, efficiencies less than 90 per cent ordinarily are obtained; and at 1.50 specific gravity, high efficiencies cannot be accomplished, except by careful sizing or classification of the feed to the cleaning units. Where the market or other requirements at a particular washing operation require separations to be made near 1.5 specific gravity, the over-all efficiency of the operation may be maintained at the high figure by making a secondary coal product, but the efficiency of separation at 1.5 specific gravity is generally so low as to prevent economic operation if only two products are made.

Unfortunately, the raw coal that contains no true middlings—that is, no material of intermediate density—is as non-existent as is the coal of the legendary salesman who declared that his product contained no B.t.u. The quantity of true middling in different coals varies widely, as may be seen by referring to the specific-gravity analyses of various coals of the United States published in Bul-

*The articles published in preceding issues were: "Suiting the Plant to the Preparation Job," by J. B. Morrow, preparation manager, Pittsburgh Coal Co., February, 1931, p. 57; "Coal Preparation Plant—The Structure That Houses It," by Andrews Allen, Allen & Garcia, March, p. 125; "Electrification Problems of Dry Cleaning Plants," by W. D. Turnbull, general engineer, Westinghouse Electric & Manufacturing Co., May, p. 247; "Electrification Problems in Washing Plants," by E. J. Gealy, electrical engineer, Pittsburgh Coal Co., Part I, July, p. 346; Part II, September, p. 477; "Refuse Disposal Systems," December, 1931, p. 630. Another article in this series will appear in an early issue.

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letin 300 of the U. S. Bureau of Mines. In a strictly technical sense, such material may be defined as the percentage of the washery feed which is near in specific gravity to that gravity at which a separation between washed coal and refuse is attempted in a given washing point. Obviously, the amount of material within a definite range of the specific gravity at which a separation is attempted increases with decrease in specific gravity of the separating point.

Many causes are responsible for the production of middlings, but the four principal ones are as follows: (1) middlings in the form of high-ash sludge due to inefficient cleaning of fine sizes; (2) middlings due to an attempted separation of washed coal and refuse at a low specific gravity; (3) middlings resulting from improper operation or overloading of washing or cleaning units; (4) middlings inherent to, and characteristic of, a given process. These causes of middling production will be discussed briefly.

High-ash coal sludges often result from the disintegration of clay or shale present in the washery feed. Such materials when wetted with wash water disintegrate to form very fine slime. High-ash sludges also result from inefficient cleaning of fine sizes in the absence of disintegrating material, often because of the attempt to treat too wide a range of sizes in a given operation.

When a separation between washed coal and refuse is attempted at a low specific gravity, a rather large proportion of middlings, of the accidental or incompletely separated type, may be expected. This is because a larger proportion from the feed is near in specific gravity to the point of separation than if the separation were attempted at a higher specific gravity.

The remedy for middlings produced as a result of improper operation or overloading of units is obviously that of changing the operation to conform to better practice or of reducing tonnage treated. Irregular feeding of a unit is a common cause of middlings of this type, and, although it is generally agreed that a uniform feed should be provided, this necessary, primary insurance of good operation is often overlooked.

The middlings which are inherent to, and characteristic of, a given process may be considered as a special type. Although such material consists of a mixture of good coal and impurities, it cannot be regarded as accidental. A characteristic example of this type of middlings is that produced by wet tables treating unsized feeds, and in such an operation the material discharged near the corner of the table consists of fine coal and coarser impurities, for the reason that the wet table acts as a sizer as well as a gravity separator. The quantity of such material made by the table depends upon the size and specific-gravity composition of the feed and the point of separation.

Middling re-treatment of whatever character is an added item chargeable to cleaning costs. The operator's aim should be to minimize, if it is not possible to eliminate entirely, the tonnage requiring re-treatment. This may be done most effectively by careful technical control of the entire plant operation. When an operator is confronted with a contract requiring an especially clean product, it is sometimes possible to eliminate middling re-treatment entirely by making a secondary coal product of higher ash content than the first product. If a market outlet is available for secondary coal, it will minimize the loss of coal in the material rejected, or refuse, and permit efficient over-all operation.

The selection of the most efficient method of re-treatment for coal middlings cannot be made without accurate information concerning its size and specific-gravity composition. Such information can be obtained by making a specific-gravity analysis of a representative sample of a particular product by the float-and-sink method, using at least two solutions of different densities. The object of this procedure is to determine the quantities of coal, bone, and rock in the middlings and the recovery which may be possible. It then becomes necessary to know the relative size of each of these three constituents, in order to determine intelligently the most efficient method of re-treatment. This information is provided by screen-sizing the products of the float-and-sink separation, from which the average size of each product may be computed.

With this information at hand, the re-treatment process can be selected to better advantage. If the middlings product is of very fine size, some form of oil flotation probably will be the most satisfactory. On the other hand, if the middlings product is coarser than flotation size, some form of gravity concentration will be indicated by the examination. Suppose, for example, that the results of an examination similar to that just outlined show that the coal is coarser or finer in average size than the impurities accompanying it. It will then be possible to recover a portion of coal simply by screening. The results of the float-and-sink and screen-sizing tests of the sample previously examined will show what screen opening should be used, and if ash analyses had been made previously, they will also show the ash content of the oversize and undersize.

Ordinarily, however, the problem of re-treatment cannot be taken care of by a simple screening operation. The process to be selected will depend on the relative sizes of the coal and impurities. For example, if the coal is coarser in average size than the impurities, wet tabling will make a more efficient separation than if the reverse were true. If the impurities are coarser than the coal, hydraulic classification in a washer of the vertical-current type will effect an efficient separation. Similarly, pneumatic tables are able to make a more efficient separation when the refuse particles are coarser in average size than the coal particles, provided the refuse particles are not of a thin, flaky shape.

In 1928, the Bureau of Mines issued a report giving the results obtained and limitations of a method of re-treating table middlings by hindered-settling classification. This report was based on tests made with full-size equipment at the Northwest Experiment Station of the U. S. Bureau of Mines, Seattle, Wash., in cooperation with the College of Mines of the University of Washington, and demonstrated that classification was an effective means of separating fine coal and coarser impurities, such as occur in table middlings. These results, obtained in the laboratory, have since been confirmed in a difficult cleaning operation at a coal-washing plant where tables are being used to recover the coal in bony crushed second draw and hutch products from a primary treatment in two-compartment jigs. Before the installation of the classifier, the table middlings were returned to the table feed with unsatisfactory results or sent to waste. These middlings are now being re-treated in a Bird hydraulic, vertical-current classifier which makes two products—a washed product which is combined with the washed coal from the tables and a final refuse product. A substantial increase in the recovery of washed coal from the tables has resulted from this method of re-treatment.

SAFETY DEVICES + Interest Members at Mining Institute Meeting

A CHANGE made in the fans of the Pennsylvania Coal & Coke Corporation reduced the power bills of the company $14,400 a year, said J. F. MacWilliams, chief electrician, of that company, at the forty-fifth annual meeting of the Coal Mining Institute of America, which was held at Pittsburgh, Pa., Dec. 16-17. This article will be found on pp. 17 and 18 of this issue.

Further experimental work will be done to determine whether even greater economies can be effected by changes in the *évasé* opening, such that the velocity head of the emerging air current will all be converted into static head and the emerging air properly distributed throughout the orifice of emergence, instead of tending to be concentrated on the far side of the orifice from the fan. The water gage he has managed to reduce is that of the fan and not that of the coal mine itself.

George S. Rice, chief mining engineer, U. S. Bureau of Mines, Washington, D. C., said that the U. S. Navy Yard had been using such director vanes for the turning of sharp angles, and that use had been made of the experience there obtained in the ventilation of the Holland Tunnel between New York and New Jersey. H. P. Greenwald, U. S. Bureau of Mines, Pittsburgh, Pa., referred those attending to Bulletin 285 of the Bureau, in which it was shown that from 50 to 70 per cent of the power used in making a square turn in the air current could be saved by the use of such deflector vanes. If only one vane is used, it should be put nearer the inside than the outside of the turn, because it is there that the air has to make the sharper bend.

In getting these results, Mr. MacWilliams told Richard Maize, state inspector, Uniontown, Pa., the inside of the mine was not changed. There was, he said, no decrease in the loss of pressure within the mine as measured at the first crosscut. It was explained by Mr. MacWilliams that the mine resistance was increased rather than decreased because of the greater volume of air passing after the change. What interested the operator was the entire water gage which the fan had to overcome—its own internal resistance, as well as that of the mine.

J. A. Saxe, Bethlehem Mines Corporation, Ellsworth, Pa., said that he was confident that scroll losses are even more important than blade losses. Mr. Greenwald declared that the vanes are worth their cost only when high-speed air needs helping around a sharp corner.

R. Dawson Hall, engineering editor, *Coal Age,* New York City, said that *évasés* are frequently too short and too flaring. In England and France they are made longer and more like a true vase than in the United States. It seems a misnomer to describe the outlets of American fans as *évasé* openings. Vanes could doubtless be used with advantage inside the mine, as well as outside and in the fan, but only in proportion to the sharpness of the angle and the speed of the air current. The Consolidation Coal Co. has such deflector vanes operating at a rectangular turn at the head of a shaft at Monongah, W. Va., which the engineers were confident were giving good results, but which, being installed at the time when the fan was erected, had never been given a test to prove their value as power savers.

G. W. Grove, secretary, told the meeting that the institute was now free of liabilities and had a paid-up membership of 316. J. W. Paul, retiring president, pointed out that though the present administration had faced a deficit of $1,404.26 at its inception, it closed its books free of debt.

All trip riders should be supplied with whistles to signal to the motormen, declared G. S. McCaa, state mine inspector, Pittsburgh, Pa., in the course of a paper on "Safe Operating Practices in Bituminous Coal Mines." It had been found desirable, he continued, to have the assistant foreman and the fireboss of any section go through that section in opposite directions. When they meet, they exchange the information they have noted on their cards, or the

Holbrook Heads Institute

E. A. Holbrook, dean of engineering, University of Pittsburgh, has been elected president of the Coal Mining Institute of America. Other officers and managing directors selected by letter ballot to serve this year and announced at the forty-fifth annual meeting of the organization at Pittsburgh last month are:

F. B. Dunbar, general superintendent, Mather Mines, Mather, Pa., first vice-president; C. L. Lutton, safety director, H. C. Frick Coke Co., Scottdale, Pa., second vice-president; F. E. Bedale, safety engineer, Consolidation Coal Co., Fairmont, W. Va., third vice-president; G. W. Grove, mining engineer, U. S. Bureau of Mines, Pittsburgh, Pa., secretary.

Managing Directors: N. G. Alford, Eavenson, Alford & Hicks, Pittsburgh, Pa.; R. C. Beerbower, field engineer, Goodman Manufacturing Co., Pittsburgh; J. V. Berry, safety director, Bethlehem Mines Corporation, Johnstown, Pa.; M. D. Cooper, general superintendent, Hillman Coal & Coke Co., Pittsburgh; F. W. Cunningham, state mine inspector, Somerset, Pa.; T. G. Fear, general manager of operations, Consolidation Coal Co., Fairmont, W. Va.; J. J. Forbes, mining engineer, U. S. Bureau of Mines, Pittsburgh; G. S. McCaa, state mine inspector, Pittsburgh; J. W. Paul, senior mining engineer, U. S. Bureau of Mines, Pittsburgh; G. W. Riggs, engineer, Mine Safety Appliances Co., Uniontown, Pa.

cards themselves, and in completing their trip they can see if the orders which the other official has given have been obeyed. The men who are found not to have made the places safe in accord with directions should be sent home. Notices of hazardous practices should be placed on a bulletin board so that they can be seen by the men coming out. Five or six mines in his district were using these provisions.

F. B. Dunbar, general superintendent, Mather Mines, Mather, Pa., said the hazard cards made every official observant, for fear that someone might discover what that official had overlooked. Even the mine inspector has his hazard card. Mr. McCaa stated that the mine inspector often sent the fireboss ahead and then followed him up to discover whether the fireboss had observed all the hazards in the workings under his charge. R. N. Hosler, superintendent, Coal Mine Rating Bureau, Harrisburg, Pa., protested against Mr. McCaa's declaration that, when cars were being pushed, the triprider should seat himself in the front car. No cars should be pushed anywhere, said Mr. Hosler. Mr. McCaa and Thomas Lowther, state mine inspector, Indiana, Pa., retorted that no mine could be operated without some car pushing.

The present ills of the industry, said Newell G. Alford, in a paper entitled "Some Modern Mining Problems," are not chargeable to depression, and unless the industry accepts the salvation of reorganization for its own protection, it will not be solvent twelve months longer.

Four charts were presented by the author, three of which accompany this article. They are the results of a study of twelve coal-mining corporations based on financial data published by the Standard Statistics Co., Moody's and Poor's manuals and record the experience of somewhat over 10 per cent of the country's annual production. Where figures appear within the chart (Fig. 1), they have reference to the number of companies involved.

Thus in Fig. 1 the first figure, 8, near the upper curve, refers to the number of companies earning profits for the common stockholders in 1923, and the first figure, 4, near the lower curve, those not earning a profit but suffering a deficit.

The maximum yield was slightly over $20 per share, and the maximum deficit $9. Since 1923, the common stockholders have seen the earnings

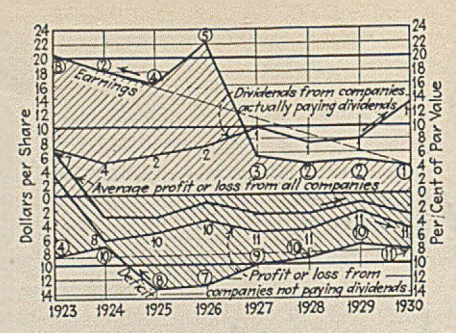


Fig. 1—Earnings and Deficits Per Share of Common Stock of Twelve Companies

of the stock decline to such an extent that in 1930 only one was earning dividends. One of the companies had in that year a deficit as high as $8 per share, and the hope of dividends for the common stockholders had gone aglimmering because of the arrears in the payment of dividends on the preferred stock. In 1923, 40,000,000 tons was produced at a profit for

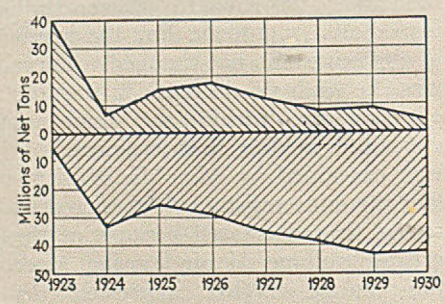
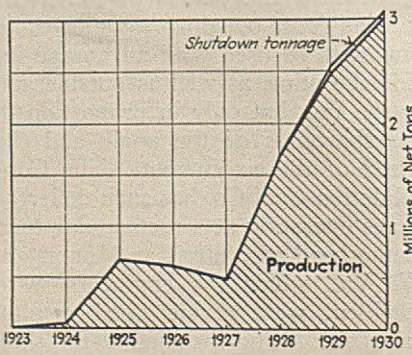


Fig. 2—Output Mined at Profit and Loss

the common stock and 5,000,000 tons at a loss, whereas in 1930, 5,000,000 tons was produced at a profit and 42,000,000 at a loss (see Fig. 2). Fig. 3 shows the coal production of mines failing or taking receiverships, 1923 to 1930 inclusive, in ten counties of one state.

At the question box, over which J. V. Berry presided, D. L. Boyle, superintendent of mines, Penelec Coal Corporation, Johnstown, Pa., said he held the protective hat in high esteem

Fig. 3—Coal Production of Mines Failing or Accepting Receivership, 1923-1930, in Ten Counties of One State



but added that because of the low coal at his mines his company had not seen fit to require its men to use it. The protective hat, said C. A. McDowell, safety and personnel manager, Pittsburgh Coal Co., Pittsburgh, Pa., had been adopted by his company. Since their adoption, nine cases have been recorded of employees who were saved from serious head injuries by the use of the protective hat. Three of these accidents probably would have been fatal.

At the Penelec Mines, said Mr. Boyle, since the introduction of the protective shoe, there had been three foot accidents without serious injury. In one case a loaded car left the track, and the bumper fell on the miner's foot; in another, several cars ran over a triprider's right foot and caused only a laceration and contusion of the large toe. Protective shoes received Mr. McDowell's full approval, but he did not speak so well of protective bootees.

J. V. Berry, in opening the discussion on the value of goggles, declared that 30 per cent of the men at the mines of the Bethlehem Mines Corporation wore goggles, and that accidents to the eye had decreased 75 per cent. The spectacle goggle gave 90 per cent protection to the eye, was used by the miner throughout his work, and gave satisfaction.

As conclusive evidence of the value of goggles, Mr. McDowell said that since their introduction eye accidents had been reduced yearly as follows: In 1929, 14 per cent; in 1930, 12 per cent; in 1931, 37 per cent.

At Harwick Mines, said Mr. Gibbs, protective hats had reduced accidents to head, neck, shoulder, torso and chest from 64 in 1929 to 14 in the first ten months of 1931; goggles had decreased accidents to the eyes from 29 in 1929 to 6 in the ten months of 1931; and hard-toed shoes had cut the accidents to foot, ankle, and toes from 51 in 1929 to 11 in ten months of 1931. In two instances the protective hat saved its wearers from a fractured skull.

Loose coupling hooks are carried by all brakemen at the mines of the Consolidation Coal Co., said F. E. Bedale, safety engineer of that company in Fairmont, W. Va., in an address on safety in haulage. That practice had been found quite helpful in reducing the number of accidents. Haulage certification cards have greatly reduced accidents. No man can be employed on a trip unless he has passed a physical examination.

(Turn to page 18)

MINE BRIQUET PLANT + Concentrates on One Coal To Achieve Uniformity in Quality

By L. EPPERLY
Vice-President and General Manager
Winding Gulf Collieries
Bluefield, W. Va.

IN the fall of 1929, the Winding Gulf Collieries, of which Justus Collins, of Charleston, W. Va., is president and principal owner, decided to enter the briquetting industry and to endeavor to manufacture a pure product and one that would not crumble in storage and use. Davy, McDowell County, West Virginia, was chosen as the location for the initial plant because of the favorable characteristics of the Davy-Sewell coal as produced at the company's mines and available at that point. Although soft in structure, this coal is low in sulphur and in volatile matter, and what little ash it contains will not fuse until temperatures above 2,700 deg. F. are attained.

Actual plant construction was begun in the latter part of 1929 and the erection of the plant was completed early in the summer of 1930. Nearly a year of experimental work followed during which many difficulties in the process and in the operation of the machinery were encountered, each of which was a problem in itself, though definitely related to the others. In the solution of these problems and in the correction of mechanical features, the old adage, "experience is the best teacher," was applied with the result that the owner finally attained his goal of manufacturing a briquet that would be of a new standard of quality.

The equipment consists of two complete units each independent of the other but arranged "in parallel" in one structure. Combined capacity of the two is 800 tons per day of 24 hours' continuous operation.

Slack coal from one of the tipples moves on a short conveyor to a storage bin adjacent to the briquet plant and that from the other mine is transported by rail. In order to work out a convenient track arrangement, it was necessary to locate the railroad car dumping point 600 ft. from the storage bin and install a belt conveyor between them. The cars when emptied of slack coal move down by gravity to the point at which the briquets are loaded.

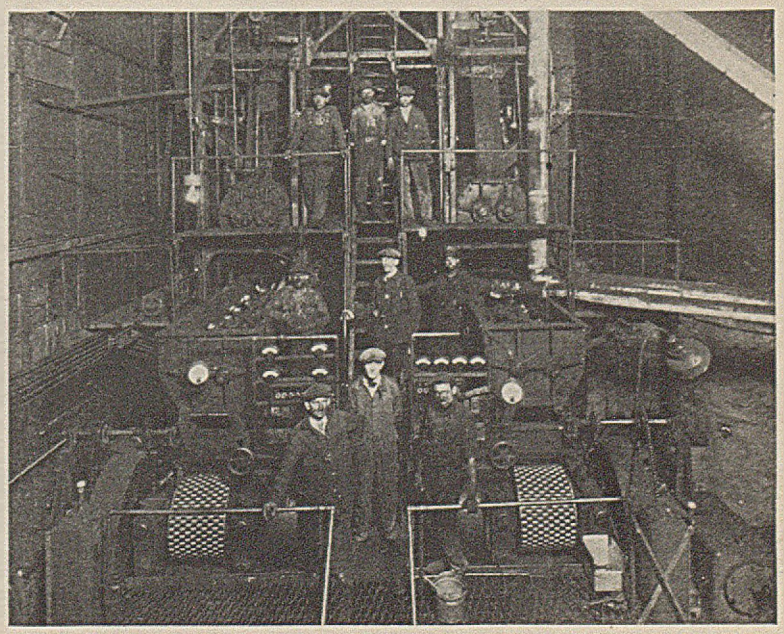
From the storage bin, the coal is fed into semi-direct-heat rotary kilns or dryers, the furnaces of which are equipped with Iron Fireman automatic stokers that assure proper temperature control during the drying process. The same type of stoker is used on the furnace of a steam boiler which is located in the same room with the dryers and is equipped with super-heat units.

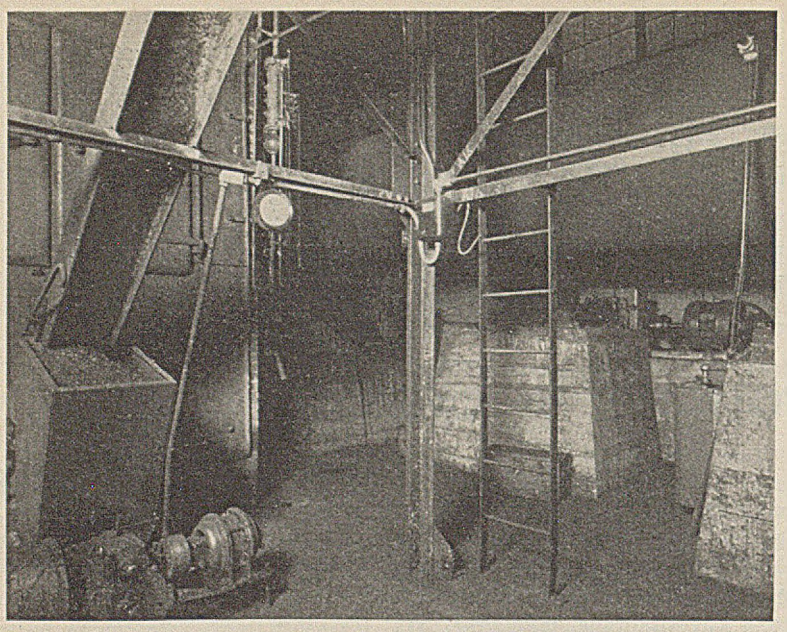
After leaving the dryers, the coal is elevated to bins from which it is fed to pulverizers of the hammer type. The product is then elevated to surge bins from which it is fed at uniform rate to preheaters in which it is brought to the optimum temperature for its admixture with an asphalt binder.

From the preheaters it is passed to the mixing units, at which point in the process the binder is introduced. Here the pulverized coal and binder are thoroughly mixed and the whole kneaded at another suitable temperature. From the mixers the material is passed to conditioner units where the temperature is again changed to one that will give the best results when the coal dough is subjected to the heavy pressure of the rolls which form the briquets.

On leaving the presses the newly made briquets are passed to a cooling

On Each Side at the Bottom of the Illustration May Be Seen the Front Rollers of the Two Presses





Steam Boiler With Automatic Stoker and, at the Right, a Rotary Dryer

belt of steel matting. While being thus conveyed several hundred feet to the loading point the briquets are sufficiently cooled and hardened to permit of their being loaded into railroad cars without breakage. Open cars are loaded by means of an apron-type boom and the closed equipment by means of a box-car loader.

Total connected horsepower of the briquet plant, including conveyors, is 600. The drive equipment consists of 45 motors ranging in size from 1 hp. to 75 hp. Excepting V-belts used on the dryers, the drives consist principally of gear reducers of the worm type. Power is purchased for the operation of the plant, though an individual generating plant near the tipple is still being operated to supply power to the mine.

Approximately $450,000 has been invested in the briquet plant and its auxiliaries. This includes the cost incurred during the experimental period, when many changes were made. Principal items of equipment, including boilers, dryers, mixers, and condensers, were built by the Vulcan Iron Works; elevators and pulverizers, by Jeffrey Manufacturing Co.; motors, by Westinghouse; speed reducers, by W. A. Jones Foundry & Machine Co.; binder tanks, by Sharpsville (Pa.) Boiler Works; and building by Truscon Steel Co.

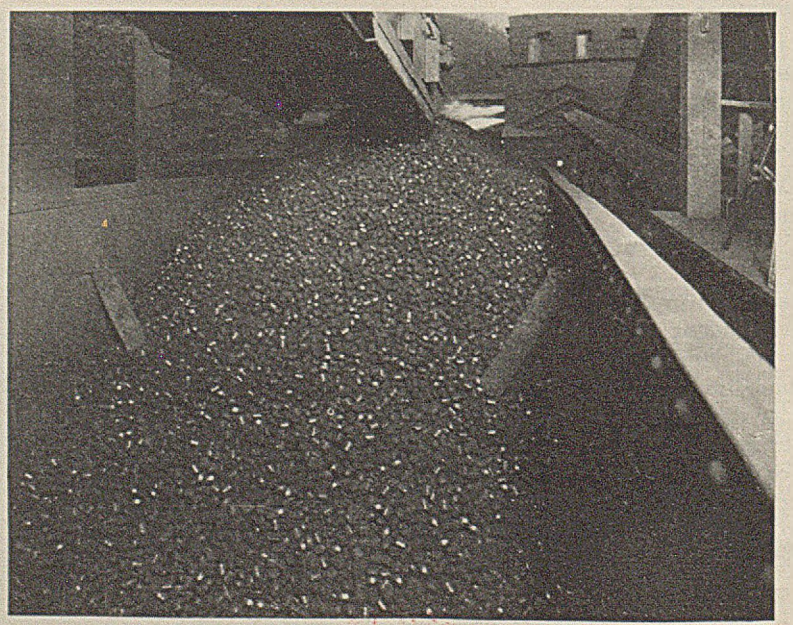
The briquets are being made in the popular size of about $1\frac{7}{8}$x$2\frac{1}{8}$x$1\frac{5}{16}$ in. and each weighs approximately $2\frac{1}{2}$ oz. Close control of the raw materials and finished briquets is assured by regular testing in a fully equipped laboratory adjacent to the plant.

Raw coal is analyzed daily for ash content, and the binder material as received is tested to determine its melting point, penetration and ductility. Sieve tests of the pulverized coal are made every six hours while the plant is in operation. Samples of the briquets are taken from each car loaded. These are subjected to tumbler tests, and the crushing strength is determined in a hydraulic press. Finally, the binder content is determined and the complete data then recorded and filed for reference.

"Miltrena" briquets, as the plant product is termed, are outstanding for uniformity, low ash, high heat value and freedom from degradation. The first three characteristics are due to the use of a superior coal from a single seam instead of screenings from a variety of seams. The strength of the briquet and its resistance to degradation and weathering are the result of experience gained by experimentation and of the close control maintained throughout the manufacturing process.

"Miltrena" briquets are handled by the Smokeless Fuel Co., with executive offices and headquarters at Charleston, W. Va., and with branch offices at Norfolk, Va.; Chicago, New York, and Toledo, Ohio. The Pittsburgh Coal Co. of Wisconsin is the exclusive agent in Minnesota and in the Dakotas for both all-rail and dock shipments.

Loading the Briquets Into an Open Car



REMODELED FANS + Give Mines More Air*

By J. F. MACWILLIAMS

Electrical Engineer
Pennsylvania Coal & Coke Corporation
Cresson, Pa.

IN SEEKING means of improving the ventilation system of a mine the importance of the fan as a part of that system should never be overlooked. Walter S. Weeks, now professor of mining, University of California, Berkeley, Calif., states on page 111 of his book on "Ventilation of Mines" that:

> An exhaust fan takes air at a pressure below that of the atmosphere and raises it to that pressure. It cannot raise it any higher, for that is the pressure at the discharge. If a chimney is placed on the discharge, the air will not be raised to atmospheric pressure until it reaches the top of the chimney. If some of the velocity pressure can be changed into static pressure before the air leaves the chimney, this pressure will be added to that which the fan would produce without the chimney.
>
> As the discharge pressure cannot be any higher than atmospheric, the increase in water gage will manifest itself in the lowering of the absolute intake pressure, and a greater flow of air will result. So if an *évasé* chimney, as it is termed, is placed on an exhaust fan, more air can be circulated at the same fan speed or the same quantity at a lower speed. The introduction of the chimney causes a marked gain in efficiency, for power is recovered that would otherwise be wasted.

Too often today engineers do not have funds available to reconstruct their fans so as to obtain the results which they desire. They are fortunate indeed, therefore, if they can find a way to effect important savings by minor and less expensive changes in the fans already installed. In the case of the Pennsylvania Coal & Coke Corporation, fans purchased many years ago had become inadequate for the needs of the mines. In places gas had been found, thus making the circulation of a larger quantity of air necessary. In one instance a fan that had been purchased for blowing had to be run exhausting.

This fan is illustrated in Fig. 1. The blow fan, which had to be reversed had an *évasé* somewhat as shown in solid lines. It was realized that if the *évasé* was properly designed for an exhaust fan it would reduce the pressure loss which the abrupt reduction of the discharge to atmospheric pressure inevitably occasioned. A new *évasé*, therefore, was purchased for this fan. Before the change, with a water gage of 2.4 in., 69,000 cu.ft. of air per minute was obtained. After the change 81,400 cu.ft. was furnished with a 3-in. water gage. If the change had not been made, that volume of air could not have been obtained without raising the water gage to 3.33 in. The horsepower would also have had to be augmented 60 per cent, whereas, as a result of the change, it was increased only 30 per cent. After the first installation was made and the results checked, *évasé* openings were built at the company's shops for two other fans, with practically the same results.

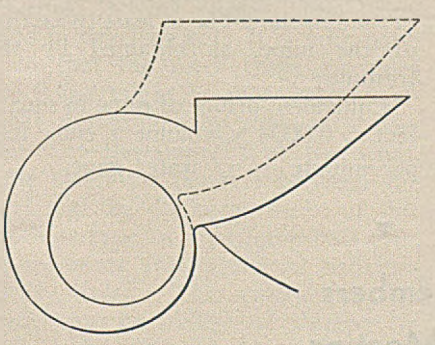


Fig. 1—By Change in Evasé, Capacity of Fan Was Increased

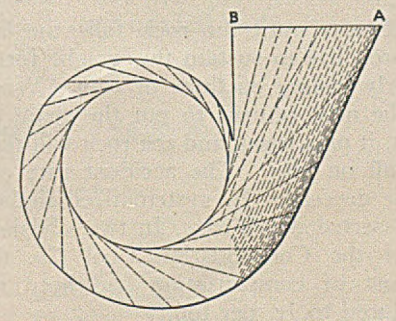


Fig. 2—In This Fan, All the Air Was Discharged at the Evasé Lip

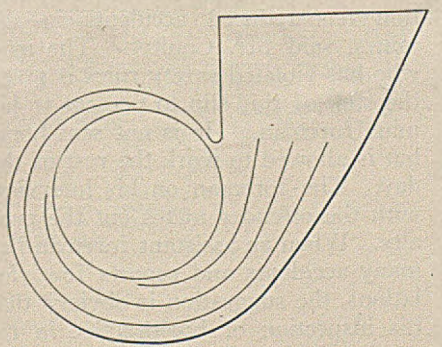


Fig. 3—Here, Turbulence Eliminators Are Inserted in Scroll

The next need presented was the remodeling of an exhaust fan, so that it would give the additional air required without increasing the cost of ventilation unduly. An additional cost of $300 per month would have been inevitable if the effort had been made to get the increased volume of air without any such preliminary remodeling. Experiments were made on this fan to see if its efficiency could be so improved as to save a part of this $300. In checking conditions at this fan it was found that the velocity of air escaping from the side of the *évasé* marked *A* in Fig. 2 was 7,000 ft. per min., whereas it was zero on the side marked *B*. It was evident that the air traveled, more or less, in the direction shown in Fig. 2, and that in consequence there was much turbulence, which explained in part the inefficiency of the fan. Experiments were made, therefore, with the turbulence eliminators shown in Fig. 3. Before the change the fan was passing 82,000 cu.ft. of air with a water gage for the entire system of 3.2 in. After the change, with a water gage of only 3.125 in., 96,000 cu.ft. of air per minute was passed, and the efficiency was increased 14.1 per cent. Similar results followed the addition

*Abstract of an article on "Increased Ventilation of Mines With Reduced Power Consumption," read before the 45th annual meeting of the Coal Mining Institute of America, Pittsburgh, Pa., Dec. 16, 1931.

of turbulence eliminators in two other fans.

R. F. Kent, E. B. Williams, and A. A. Criqui, in the latest edition of Kent's Engineers' Pocket Book, state that "an *évasé* which reduces the velocity from 1,000 to 500 ft. per min. makes it possible to increase the volume by 8 to 10 per cent, with an increase in horsepower of but 3 to 5 per cent." In the *évasé* of one of the fans of the Pennsylvania Coal & Coke Corporation, the velocity of the air on one side of the opening was reduced from 7,000 ft. to 2,000 ft. per min. The most recent experiment was with a fan purchased ten years ago and recently transferred to another mine. Eliminators were installed in this fan before it was placed in position. This fan is illustrated in Fig. 4. It circulates 31,000 cu.ft. per min. at a water gage of 1.13 in. The horsepower in the air is 5.5, the efficiency of the belt drive is taken at 93 per cent, and the brake horsepower is 8.8, an efficiency of 62.5 per cent.

Many formulas have been devised for the design of ventilators, but after checking a number of them against the operation of efficient fans, the rule 0.354 volume $\div \sqrt[4]{}$ water gage

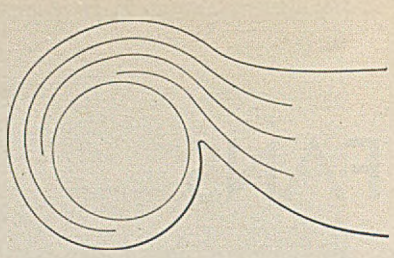


Fig. 4—Slightly Different Arrangement of Vanes

seems to give the best results of any.

When it is considered that the U. S. Navy has found that the water gage lost in the entrance or inlet to the fan equals $(\text{velocity})^2 \div 4015$, (see page 935 Coal Miners Pocket Book), the latter figure, 4015, being the velocity to produce 1 in. of water gage, it is easily seen that the friction loss of the air passing through the fan may be greater than the loss in passage through the mine.

The equivalent orifice of the inlet to the fan should be at least twice that of the mine, as obtained by the formula:

Equivalent orifice of mine in square feet $= 0.0004 \times$ volume in cubic feet per minute $\div \sqrt{}$ water gage.

▼ ▼

Safety Devices Interest Members At Coal Mining Institute Meeting

(Continued from page 14)

He must not be old and must have a card certifying his fitness for such employment.

The joint faces get closer and closer as the Great Uplift is approached, said G. H. Ashley, state geologist, Harrisburg, Pa., in his address on geology. In the block coal of Indiana, cleats into which one can thrust a knife can be found, and in some cleats of that region even a finger can be inserted. It has been noted that when a bed becomes thin, it is the upper part of the bed which suffers the lesser diminution.

In the discussion of systematic timbering it was stated that some roof was so badly creviced that the timbering should be set solely in relation to the crevices. However, standardization of timbering was preferable as a general practice. Power prop pullers can loosen as many as four props at one time, pulling slowly at first when loosening the prop and faster after the prop has been loosened. The props should be all removed together, because until the rock falls the last prop has to sustain the weight formerly resting on three or four. When the man returns to put the chain on it, it may break and the rock will then fall on him. The accident rate can be decreased by systematized timber, asserted Mr. Fear. In two divisions of the Consolidation Coal Co. the cost of compensation had been reduced to 1c. per ton.

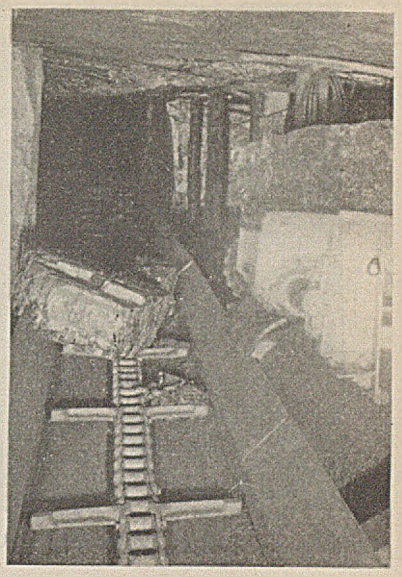
The magic pink slip used by the Clearfield Bituminous Coal Corporation has reduced accidents in the mines, said Mr. Coulter. The man who has violated safety rules is given the stub of this slip to present to his mine foreman. He is not sent home but is allowed to work the rest of the day. The foreman on his interview with the offender metes out the penalty. When an assistant foreman has many accidents and reports few violations, the suggestion is obvious that his inspection or his practice in reporting accidents is lax.

A way of meeting certain roof troubles, said Alex Jack, state mine inspector, Cresson, Pa., had met with much success in his district. The mines are working the B seam, which is 40 in. thick. The roof is of a strong shale interspersed with small beds of sandstone. When entries were driven there was no trouble for some months, but suddenly without warning a hundred or so feet of heading would cave in, killing any men who might be in that part of the heading and immuring those inby that point. This action seems to be ascribable, said Mr. Jack, to expansion of the roof rock. Six companies have been using caving chambers in the attempt to meet this difficulty. The entries usually consist of four headings driven abreast with moderate pillars between adjacent pairs and an abnormally large pillar between these pairs, in the center of which pillar is driven a wide room called locally a "caving chamber." The width chosen usually is 40 ft.

The width of the chamber assures that it will fail from structural weakness as soon as it is completed. The cover, said Mr. Jack, runs from 450 to 1,100 ft. In some cases the caving chamber seems to have removed the difficulty with the heading roof, but in other cases the improvement has been only fair, and in still others it has been entirely unsuccessful. Mr. Hall remarked that the success probably was due to the expansion of the roof into the area which had caved; that expansion if not provided horizontally—that is, laterally—must take place vertically.

Mine cars are the most lucrative investment around a coal mine, said N. A. Elmslie, division superintendent, Bethlehem Mines Corporation, Barrackville, W. Va. There should be, he declared, as many cars in the mines as could be hoisted in one working shift. Cars were the storage factor of a mine. If anything went wrong, they should be there to keep the miner working in his chamber and the trips running on all unblocked tracks, ready to be hoisted and unloaded as soon as conditions were readjusted. As justification, he pointed out that at two of his mines 60 loaders, 30 to a mine, had each loaded 20 tons in 4 hours, drilled three shotholes and set his posts. They were out of the mine in 6 hours. The men worked in pairs. One man loaded 22½ tons. Too many were hampered for lack of cars in reaching the tonnage that they could otherwise attain. The output per day for every man in his mine averaged 19 tons.

ROOM CONVEYORS + Add to Profit Margin Mining Thin Seam in Indiana

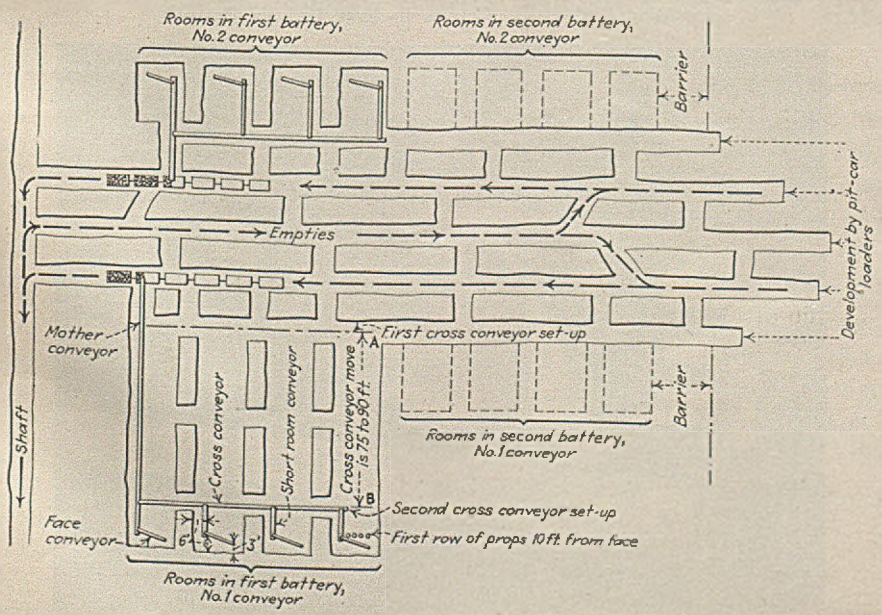


Junction of Cross-Conveyor With Main Room Conveyor. Note Size of Lumps

IN the Submarine No. 2 mine of the Ferguson Coal Co., Clinton, Ind.. the No. 4 seam has characteristics which strongly recommend the use of room conveyors in the mining of it. One is the comparative softness of the coal; another is the thinness of the seam. Either one of these alone might be sufficient reason for the choice. Together, they leave little room for argument.

By the use of conveyors, realization from the product has been increased by a greater yield of the larger sizes, and costs have been appreciably lowered. At the time of this writing two conveyor units are in operation and plans are contemplated for installation of a third. Three Fairfield pit-car loaders are being used in development. It is said, however, that the work these machines are doing might be more advantageously undertaken by conveyors. Because of the thinness of the seam, little clearance remains between the roof and the discharge boom of this machine type, so that lump coal even of moderate size cannot be satisfactorily loaded. This restriction also limits the possibility of loading by mobile shoveling machines. A small tonnage is being loaded by hand methods, but the practice is considered uneconomical and will be discontinued.

Working Plan Showing Arrangement of Equipment

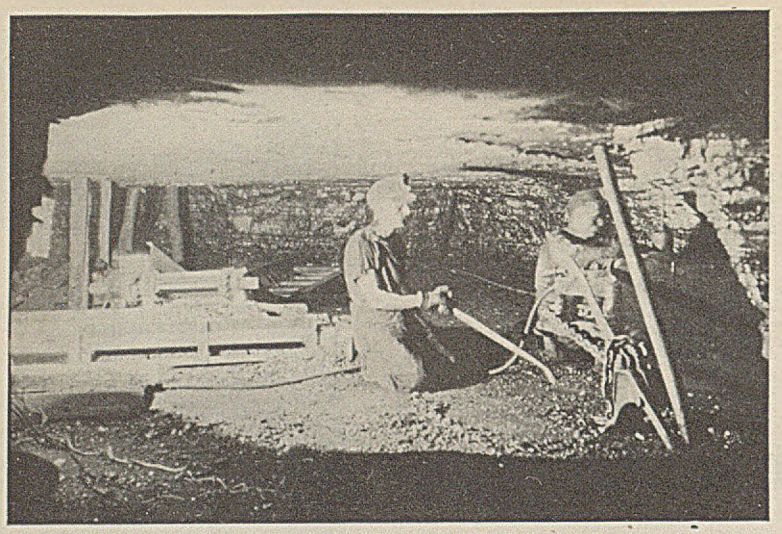


One of the conveyor units in operation is a Tracy three-room "Koalveyor," made up of one 300-ft. mother conveyor to which two short room conveyors are tributary via a crosscut conveyor. Intermediate sections are interchangeable. Coal is loaded onto Goodman-Chicago automatic face conveyors. These, and also the room and cross conveyors are of the two-chain type. On the room and cross conveyors, the upper strand moves in a pan section which is supported by a detachable angle-iron underframe. This lower section carries the return flight of the conveyor chain. Power is transmitted through Cleveland speed reducers and sprocket chain, and is regulated through a reversible controller.

Where this unit is being used the seam is only 42 in. thick. Yet from three 25-ft. rooms a crew of eleven workers and a boss is regularly producing 125 to 150 tons in eight hours, the average being 135 tons.

In arriving at what it believes to be the best conveyor layout under the conditions encountered, the company has had to do considerable experimenting. The ideal set-up, of course, would be one which mined the greatest number of rooms in a single battery. It was believed that the three-room battery yields too small a tonnage from a working territory and is too costly in overhead of labor, equipment, and general section maintenance.

A five-room battery was tried, only to be given up as impracticable under



An Example of Ideal Conditions for Conveyor Mining

the conditions, because a satisfactory cycle could be neither scheduled nor maintained. There was too great a spread in the work for a crew of an economical number. A specific instance of the trouble is that the cutting crew was unable to keep up with the loading rate. Off-shift assistance in the cutting would not have helped. It was with misgiving that the five-room system, with its "idealistic" advantages, was abandoned.

The four-room battery, adopted as an alternative, has been demonstrated to be the best suited to this mine. In 4 ft. of coal the four-room battery employs only one man more to yield an average of 40 tons more per shift than the three-room battery in 42 in. of coal. A crew of twelve workers and one boss is consistently producing 175 tons per shift, the high being 196 tons and the low 150 tons.

Layout details of the four-room system are shown in the accompanying sketch. It being the intention to drive the rooms in two directions from the panel entry, the latter is composed of three headings. The rooms on each side have an individual load track, and between these is an empty track for common use. On each side of and paralleling these three headings, a line of crosscuts is driven, as at *A*, which accommodates the first cross-conveyor set-up. This conveyor carries coal from the second, third, and fourth rooms to the mother conveyor in the first room.

Rooms are driven 25 ft. wide on centers of 35 ft. and 300 ft. long. A panel is of a length that will accommodate 26 rooms on each side of the entry, leaving a small barrier pillar at intervals of eight rooms. This measure is taken because the No. 5 seam, 90 ft. above, has been worked out. No attempt will be made to recover pillars. Line brattices are used in the rooms to assure ample ventilation of the faces.

Crosscuts are driven through the room pillars at intervals of five or six cuts. It is not until the room faces have been advanced beyond two of the crosscuts inby the cross conveyor that the latter is moved up, as from *A* to *B*. The distance varies from 75 to 90 ft. It takes six men and a boss about two hours to make this move.

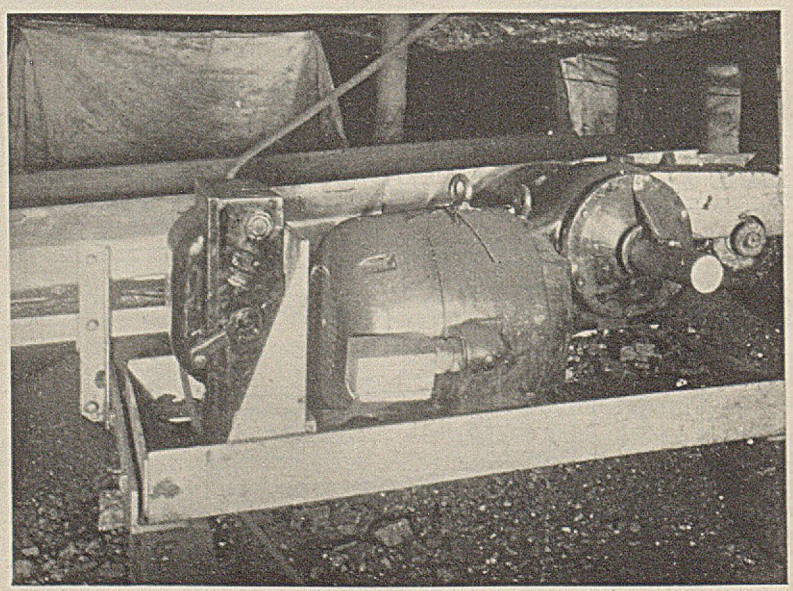
In this layout Fairfield flight conveyors are employed, the face conveyors being of the two-chain type, and the room conveyors being single chain. Main-, cross-, and shortroom units are all of the same design, so intermediate sections are interchangeable. The capacity of these conveyors is 90 tons per hour—high, perhaps, considering that the peak output for a day thus far has been about 200 tons. But since large lumps are handled, the conveyors must be proportioned accordingly. A 15-hp., 1,750 r.p.m. Imperial motor drives 300 to 350 ft. of mother conveyor through a Horsburgh & Scott 15 to 1 speed reducer. The drive section, at which end the mine cars are loaded, is mounted on a substantial elevating support constructed of welded angles.

Short-room conveyors and the cross conveyor are equipped with an interchangeable drive. This is a 5-hp. Master geared-head motor, which, as the type terminology implies, is a combination of motor and speed reducer in one housing. It is controlled by a Square-D Bulldog switch. Referring to the sketch, the face conveyors are 14 ft. long. They are turned at an angle to the face to shorten the average shoveling distance. This unit comes in two coupled pieces and can be lengthened by insertion of an intermediate section. It is driven by a 3-hp. geared-head motor.

Complete, the conveyor equipment for the four-room layout costs about $11,000. It is estimated that the economical life of this equipment will be four years, and a per-ton charge of 10c. is being made for interest, depreciation, and maintenance.

A crew consists of five loaders, two cutters, one driller, one conveyor and timberman, one mine-car loading attendant, one motorman, one triprider, and one section boss. These thirteen men, whose duties on occasion overlap, perform all the work necessary to take the coal from the solid and put it on the parting. They do not, however, make major conveyor

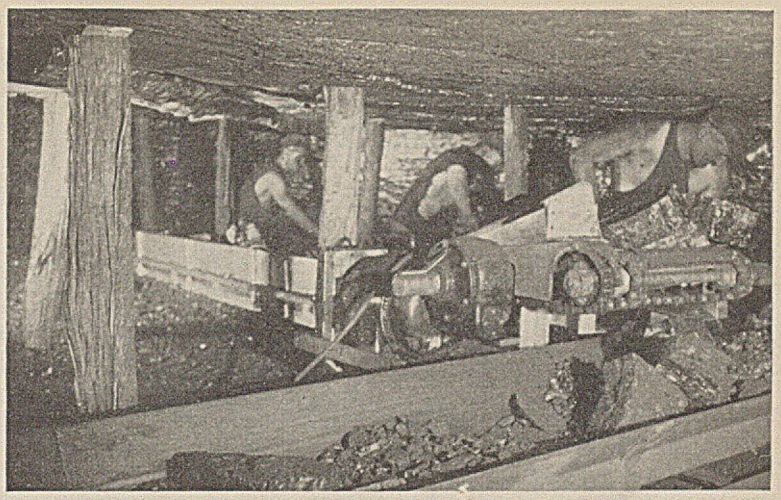
Speed Reducer Integral With Motor. This Is the Arrangement on All but the Main Conveyor. Canvas in Rear Is Line Brattice



moves; these are handled at night and comprise the extent of off-shift work.

An attempt is made to adhere to a fixed working cycle, rotating in a direction from No. 1 room to No. 4, but not always is this possible. Usually two places are being loaded out while the third is being drilled and the fourth cut. Ordinarily, two cuts are taken from each place during a shift, each cut yielding 20 to 22 tons.

Timbers are set immediately after the face is cut and drilled and the face conveyor moved up. As the roof is sound except where horsebacks are encountered, the nearest row of props usually is set 10 ft. from the face and outby the face conveyor. Props are set on 4-ft. centers. A surplus of shortwalls being available, each room is provided with one of these machines.



Loading at the Face. In This Case the Roof Needed Support in Advance of Conveyor. Notice Horseback in Roof at the Left

Horsebacks occur rather frequently and give no end of trouble. Their shape is lenticular, but as their length is irregular, it is not always feasible to drive through them. When they are of great size and run parallel to a room the face is abandoned and the room picked up ahead through a crosscut.

Blasting methods at this mine are unusual. The coal being easily broken, light shots are used. With an electric drill, holes of $2\frac{3}{4}$-in. diameter are put in to within 1 ft. of solid coal. These are placed at and parallel to the roof. Four holes are used, the interval between them being 6 ft. Each of the rib holes is charged with $\frac{1}{2}$ lb. of Dupont No. 11 Monobel permissible, and the center holes each with $\frac{1}{4}$ lb. of the same explosive. Blasting is by fuse with cap, one shot at a time. Because a permissible powder is used and ventilation aided by line brattice, fumes and smoke are cleared from the face a few moments after blasting.

Bugdust is not removed from the cut. If it were, the coal would drop en masse, with no tendency to roll out. Shovels are worked against and into the bugdust as far as they will reach. The front of the cut is then snubbed slightly with bars and the coal rolls over.

By this method there has been achieved an increase of 50 per cent in 6-in. lump over the yield from the methods followed when loading by hand or by pit-car loaders. This has given an enhanced realization in the cold months, as the lump brings a premium of 50c. a ton over egg size. Forty-eight per cent of the product passes over a 2-in. round screen opening, and 55 per cent over a $1\frac{1}{4}$-in. opening. This represents an improvement, which the conveyors make possible and which, it is said, has never before been attained in the annals of mining this particular coal.

Accident Rate Lowest on Record

THE coal-mining industry in the United States presented a Christmas gift to the American people by mining approximately 437,000,000 tons of coal in 1931 with a smaller loss of life from accidents in the mines than in any previous year, according to Scott Turner, director of the U. S. Bureau of Mines. Information available for the year up to Christmas eve indicated that the industry would complete 1931 with a better safety record than ever before, as far as the relation between production and accidents is concerned.

Production during the year just closed promised to average 296,000 tons of coal for each life lost from accidents. Five years ago the production was 261,000 tons for each life lost; ten years ago it was but 254,000 tons, and twenty years ago it was only 187,000 tons per death. This progress in coal mining is chiefly due, according to Director Turner, to effective accident-prevention by many of the leading operating companies, to state and federal mining officials and other mining organizations, as well as to technical improvements in the industry that enable the average miner to produce more coal per day than was possible when more primitive working methods were in vogue in the mining industry.

COAL AGE

SYDNEY A. HALE, *Editor*

NEW YORK, JANUARY, 1932

Shadowland

DEVELOPMENTS in the campaign for district selling agencies in the bituminous regions put a sharper edge on the legal uncertainties which confront many economically desirable group efforts in business. Here is a proposal sponsored by responsible industrial leaders as an avenue of escape from a situation of senseless jungle competition which has inflicted heavy losses upon both capital and labor and has provoked widespread condemnation. What happens?

Within the industry itself, despite the assurance of eminent counsel that what has been suggested is not in violation of the anti-trust laws, the specter of the Sherman Act still haunts the doubting. From counsel for the United Mine Workers comes a direct attack, charging the plan contravenes the precepts of the statutes and the rulings of the courts. And the Department of Justice apparently, and not unnaturally, is not without a fleeting curiosity on the subject.

That such doubts may be unwarranted is a secondary consideration; the reality of fear is not determined by the solidity of its foundations. Rather is its existence in this instance another striking proof that the need is paramount for clarification by amendment of the forty-year-old statute upon the meaning of which neither business, the bar, nor the bench can agree. Confusion so ancient when measured by the swiftness of economic progress must be attacked at its source—the language of the law itself.

Wanted: more 1931s!

FOR the most part, the record of the year just ended was such a sorry one that only the incurable optimist indulging in the favorite cliché of the sweet uses of adversity could honestly cry for an early repetition of its dubious material benefits. But there is one section of the record in coal mining that makes 1931 memorable in no invidious sense. That is the section chronicling the progress in accident-free operations.

Information flowing into the U. S. Bureau of Mines showed that the safety record in 1931 to Dec. 24, when considered in terms of tonnage produced per fatality, was the best in the history of the coal-mining industry. The closing week of the year had no gruesome major accidents to mar the record which indicated an average output per fatality of 296,000 tons, as compared with 261,000 tons in 1926, 254,000 tons in 1921, and 187,000 tons in 1911. To that extent, at least, a year of depression was shorn of a part of its industrial waste and tragedy.

Jubilation over this accomplishment, however, would be ill-timed and futile if uncoupled with resolution to continue the fight against accidents with renewed determination. The record of the industry both in deaths and in non-fatal accidents is creditable only in comparison with less favorable records of the past. There are still too many accidents in coal mining, and the growing list of mines which have succeeded in operating over long periods without such accidents makes the glib alibi of natural hazards too thin to cover two prevalent defects of management, lack of proper training, and soft discipline in the face of danger.

Fan problems get renewed attention

J. F. MACWILLIAMS, in his remarks at the recent annual meeting of the Coal Mining Institute of America, reopens the whole question of fan design. It may well be that, now that the scroll is to consist of several passages instead of one only (how many has yet to be determined), it may be necessary to change the shape of the blades, for a truly tangential delivery is more essential when the confines of the scroll passage are near the point of delivery than when they are more remote. The flaring of the stack and its height also may be affected, for, as air will now travel at a lower speed at the outer edge of the scroll and at the far side of the stack, it will need less travel to obtain the necessary distribution and loss of velocity.

Of course, an increased height of stack may be desirable if only to carry to a higher level the methane in the exhausted air and to prevent that air with its methane content from being drawn into a near-by intake, especially when the mine is in a valley and the hills are so high, heavily wooded, and fog-laden that the supply of air is limited and the exhaust air cannot escape. In other cases, winds may prevail that will carry the exhaust to the intake. For these reasons, the lofty stack, preferably run up the side of the hill if there is one, would have its advantage. One cannot quite rid one's mind, if one would, of that disaster in Belgium when a heavy fog held down industrial furnace gases over a well-populated area and thereby caused many deaths.

Whether at any mine there is any recirculation of air can easily be determined by an analysis of the intake. If there is none, there can be no need for tall stacks or wind tunnels except to decrease fan losses, but, where there is such recirculation, it would be economy to introduce such air passages, for with them the volume of air circulated could be reduced, which would serve in itself as a means

of reducing recirculation, because the quantity recirculated depends always on the volume being drawn into the fan. The more air delivered the more impure will be the air delivered to the mine, if only a limited ingress of atmospheric air is available.

Cleansing mine waters

ACIDITY in mine water apparently is not beyond a measure of control, to judge by the address of Dr. W. L. Stevenson at the Third International Conference on Bituminous Coal. By a fortunate combination of circumstances, pyrite needs oxygen to convert it to a sulphate and thus to render it soluble, whereas limestone will dissolve in water without any such preparation. Consequently air-free water presented with a diet of pyrite and limestone will gorge itself on the latter and reject the former. As the waters coming into a mine from unaerated measures will be alkaline, acid mine waters stored without air will receive no further acid material and may become charged with an excess of alkali. If they have any air, the ferrous sulphate, in being converted to ferric sulphate, will abstract what air is entrained and leave the pyrite without means of oxidation.

But granted that water is so treated and caused to become alkaline, there will still be the ferrous and ferric hydrates, and, as Dr. Bach declared, these are harmful to fish, vegetation, and water pipes.

Frequently, underground, the necessary air is available in the water to make ferric hydrate, and if the mine water thus contaminated is decanted by standing in storage; and by removing water only from the surface, much of the ochreous matter will be left in the mine. If the water falls in a cataract (natural or provided), down a hill, or over a weir in leaving the mine, then the water will complete its oxidation and drop its ochreous impurity on the soil.

Perhaps it may be necessary to drop the water into a sedimentation basin or even to treat it underground, which could be done by letting it fall through the air into a chamber before removal from the mine, providing for this purpose an area fully protected against the pyrite in the ribs, roof, and floor. Compressed air might aid in the oxidation, permitting the elimination of the waterfall, thus saving an unnecessary lift and causing less turbulence than the falling of the water would create.

Any ocher sludge formed in the sedimentation chambers or tanks might be sold for the elimination of sulphur from gas, for paint, or for fertilizer. Some have said that it is not harmful to vegetation but actually helpful if plowed into the ground. Much of it, perhaps even most of it, will be deposited in the depth of the main storage areas and not in the treating chamber.

One should be careful in hazarding a guess, but perhaps mine water can be kept free from both acid and hydrate without prohibitive expense; some hope with an actual gain to the operator, because, with acid-free water, pumps will be more efficient and more easily maintained and because the ochreous material is not without value. The industry will do well to keep an open mind till more is known as to the facts and as to the public will. Certainly it will be better to seek to protect the water against acidity than to treat it after it has become acid, creating a hardness that chemicals cannot remove.

Education is learning to think

ABILITY to think is given to all of us, but few are given to orderly thinking. Most people are willing to accept every untoward condition as a finality rather than a challenge. The teacher who fails to call attention in every lecture to the inadequacy of present-day knowledge in the subject he is presenting and to the still unsolved problems to be faced fails to furnish the student with the stimulus to which he is entitled, a stimulus which will convert him, if he has the right spirit in him, from a passivity which accepts all or a part of what is presented without further use to an active acquirement of information as a basis for a future solution of such questions. Unless the teacher presses the need for further research, the student naturally concludes that there is nothing left to him; all is already solved.

He possibly cannot make all these uncertainties a matter of laboratory research, but he can meditate on them and perhaps can be asked how he would proceed if the problem were presented to him for solution; where he would look for further light; what are the principles of science to which his study of the problem would cause him to appeal; and what fundamentals he would first seek to establish. He would then go at his studies with an inquiring and analytical mind, and he would be seeking information as tools for his mental studies rather than acquiring it as means of filling his tool chest so that it would appear complete on examination and inspection. If he could realize that his diploma is less to him than his quickened powers of observation, thought, deduction, induction, and imagination, he would be converted from a mere trailer to a motor.

In this end, the stories of the inventors of new methods and discoverers of new facts will serve as inspiration. He will learn that others like him stood at the threshold of discovery and were bold enough to step across it and to progress in spite of opposition.

When his course is through the student should be in such a frame of mind that he will be prepared to question if any problem is completely, finally and satisfactorily solved, if any machine is properly constructed, and if any so-called fact is without qualification. He will be in a receptive mood for change and will realize that these problems, mechanisms and facts are his opportunity, and his attitude to his past experience and training will be less dogmatic than it has too often been.

NOTES

. . . from Across the Sea

NO complaints against low-temperature carbonization have been greater in America than those voiced about the friability and low density of the product, and about the mechanical difficulties to be confronted in successful operation. The first two difficulties could be cured by briquetting, but at great cost, and the product is expensive enough without any further expenditure on it; besides, the first cost of a low-temperature carbonization plant is staggering, even without the additional cost of a briquetting plant.

In Great Britain, the department of fuel technology at Sheffield University has been working on a system which has been devised by Piero Salerni, of London, England, which it is believed will meet the friability and low-density problems as all the mechanical difficulties and will present other important advantages. Details herein appearing regarding the plant are derived from two papers, one by Mr. Salerni and Dr. R. V. Wheeler, professor of fuel technology, Sheffield University, and one by Dr. Wheeler as sole author. Both these papers were read at the Third International Conference on Bituminous Coal, held in Pittsburgh, Pa., Nov. 16-21, 1931.

All the tests made appear to have been conducted on a small scale, the charges of coal and semi-coke aggregating in each test only about 50 lb., exclusive of the weight of the oil, which was added thereto. The purpose is to adopt equipment of the largest size. The retort will be 14 ft. in diameter and 225 ft. long, which are said by Dr. Wheeler to be the standard dimensions for cement-kiln operation. The K.S.G. retorts at New Brunswick, N. J., consisted of an outer drum 72 ft. long of 10-ft. diameter, and an inner drum 85 ft. long and of 5½-ft. diameter. However, there were eight of these for a throughput of 640 tons of raw coal daily, whereas the single Salerni retort is estimated to treat 1,000 tons of raw coal every 24 hours.

It is stated that all kinds of coking coal can be used, and even some non-coking coal, if blended with coal having agglutinating properties. The feed to the retort consists of raw coal, broken to a "fairly fine state of division," mixed with semi-coke, ground to pass a 60-mesh screen. The mix is moistened with higher-boiling fractions of low-temperature oils, enough being used to cause the charge to become granular, but not enough to render it pasty.

These additions do not slow down the operation of the retort, because the admixture of the coke powder and oil increases the thermal conductivity of the charge, so that the throughput is not materially affected, and to assist in this result neither the coke powder nor the oil is allowed to cool below 250 deg. C. before introduction into the retort. In the process, due to the redistillation of the heavier fractions of the oil, the yield of the lighter fractions is increased, the pitchy fractions, with which it is normally difficult to deal in a refining still, being left in the coke.

The plant embodies a simple continuous rotary furnace comprising an inner and an outer drum. This furnace is completely inclosed in an outer revolving casing or shell, the base of which rests within a groove, providing a hydraulic seal. The inner drum is constructed of a number of separate somewhat narrow dished plates curved in a circle, much like an automobile tire casing. These are welded or riveted one to another, thus forming an accordion-pleated cylinder resembling in a degree a large pipe of corrugated steel. Thus constructed the inner drum constitutes a good heating surface and provides, in conjunction with the outer drum, peripheral chambers, exterior to the inner drum in which heating gas and cooling gas, as may be desired at any point in the drum, can be made to travel or circulate. Between the outer drum and the outer casing is a space which largely insulates the heat in the outer drum from the outer casing. Thus this outer shell is maintained at a low temperature and is enabled to preserve its mechanical strength.

An important feature of the design is that the rotary furnace has open ends and no stationary parts are in contact with the ends. The charge is introduced into the furnace by gravity, a spiral scoop, integral with the furnace, serving to prevent a building up or escape of material. The charge travels along the furnace by gravity, aided by the rotation of the furnace, and the finished product is delivered, also by gravity, to the chute shown in the illustration.

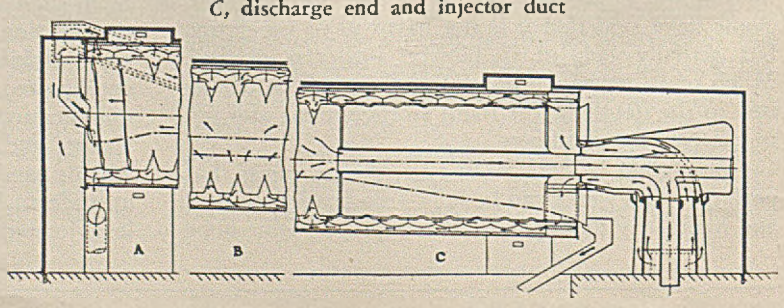
The furnace, slightly inclined, rests on rollers and is driven by gearing in the usual manner. It is heated by hot flue gases from a separate combustion chamber, injected at the discharge end into a distributing head, integral with the furnace, by an annular nozzle on a horizontal self-aligning duct member, external to the furnace. This duct member (which can be seen on the right of section *C* in the accompanying illustration) has three separate concentric gas ducts. The useful gases and distillation vapors are exhausted from the furnace through a large pipe in the distributing head, with which a central duct member aligns without actually making contact with it. This large pipe keeps the gas from contact with that part of the furnace, which having cooled walls, would otherwise condense its oily constituents. Through the intermediate annular duct, the heating gases are injected into the distributing head, and, through the outer duct, the cooling gases pass to the space between the outer drum and the casing.

As will be seen, the horizontal self-aligning duct member rests about its center of gravity on a duct standard in a spherical head, through which three separate ducts, one for the gases of distillation, another for the heating gas, and a third for the cooling gas pass and communicate with corresponding passages in the standard, the heating gas and the cooling gas being led through separate annular channels, and the gases of distillation being exhausted through a passage in the center of the standard.

The duct standard is constructed of refractory material and the horizontal duct member is made of metal, protected where necessary with refractory linings. The spherical head, between the duct member and the duct standard, is provided with grooves filled with powdered graphite to complete the sealing between the various gases and to provide lubrication.

Radial ducts in the distributing head lead the heating gas to the long annular passage which extends over the whole length of the furnace between the inner and outer drum, the inner wall of which is the surface through which heat is conducted to the charge. These hot gases flow counter to the gases of distillation. At the charging end of the furnace the heating gas passes into the casing through peripheral apertures. It is then at a temperature nearly equal to that at which the charge is introduced. It is exhausted from the casing in part through an outlet from which it is circu-

Three Sections of the Salerni Furnace. *A*, charging end; *B*, mid-section; *C*, discharge end and injector duct



lated to the cooling-gas injector, and in part, downward through the conveyor casing. The steam and waste gases given off during the initial heating of the charge are also exhausted here.

The cooling gas delivered by the injector enters through an annular receiving cone, a jacket formed around the distributing head and extending over the first portion of the heating chamber. This jacket constitutes a cool wall which robs the finished coke of some of its sensible heat and turns it to a useful purpose. A portion of the cooling gas passes direct to the annular passage between the outer wall of the furnace and the casing, which passage surrounds the annular heating-gas passage over the first half of its length.

The function of this cooling gas, apart from serving to recover the sensible heat of the finished coke, is to cool the outer walls of the distributing head and to draw heat from those walls of the annular heating-gas passage through which heat is not imparted to the charge. It thus prevents the overheating of the furnace, itself becoming raised in temperature. Thus heated, this gas on leaving its annular passage (see Section *B* in the illustration) joins and mixes with the heating gas over that portion of the chamber where the charge is subjected to a low temperature; the gases then travel together. Excess of heat at those portions of the apparatus nearest the heating-gas inlet is thus transported to that part of the furnace where it can be utilized with advantage.

An outer annular chamber serves to provide gas insulation between the annular cooling-gas passage and the outer shell of the furnace, which can be maintained at a temperature never exceeding 250 deg. C. This is also the approximate temperature of the gases which surround the furnace in the outer casing. Loss of heat by radiation through the outer casing is prevented by a layer of insulating material.

It will be seen in Section *B* of the illustration that part of the gases of distillation—those containing steam and waste gases—are being drawn to the charging end of the furnace and those containing useful gas and vapors are being drawn to the discharging end. In the equipment not a single mechanical seal is used.

The coke is discharged through a chute onto a screen, the breeze passing to a coke grinder and the lumps being delivered to a measuring balance tray working in connection with a time gear to insure that a sufficient percentage of the lump coke is added to the breeze passing to the grinder to provide the requisite percentage of coke powder in the charge.

The rest of the lump coke is tripped over onto a coke discharge conveyor, which takes it to the atmosphere. The passage through which this conveyor runs carries the flue gases and steam exhausted from the rotary furnace.

Hot semi-coke powder passes by gravity into a mixer drum, the raw coal and hot oil being introduced at the same time through separate ducts. The blend is then delivered by gravity onto a conveyor which takes it direct to a duct at the charging end of the furnace.

Because of the fine grinding, all the coke pores are broken. The specific gravity of the semi-coke, if the raw coal passes through 1/20-in. screen, averages 0.83. This high density makes for acceptability of the coke. Some coals would perhaps coke without oil satisfactorily, though the oil should be used in this instance also, for it assists in accelerating the heating and carbonization of the charge because it conducts heat better than raw coal. Incidentally, it may be stated that the heavier fractions of the oil are to a certain extent "cracked" during redistillation, and the yield of lighter oils is thus increased.

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

Flotation, by Erwin W. Mayer and Hubert Schanz; S. Herzel, Leipzig. 6 x 9 in., pp. 593. $7.84; paper; $8.31 bound.

Flotation, so far, has only a limited application to coal, but, with the growing use of fine sizes for stokers and pulverized coal, who knows how general may be its future application to all coal cleaning? Who would believe that the industrious authors of this volume had unearthed 56 installations, small and large, including one of the three test plants, of which I have heard as being, or having been, in operation in the United States, namely, that of the Pittsburgh Coal Co., at Pittsburgh, Pa.

This latter installation the book describes as having six tons per hour capacity, being of McIntosh type, treating minus 48 mesh refuse having 20-22 per cent ash and reducing it to 10.5 per cent, using, as reagents, water-gas tar, 2 lb.; cresylic acid, ¼ lb.; and lime, 3 lb. per ton of coal treated. Germany is listed as having 21 plants using flotation; Holland, one; Belgium, five; France, four; Great Britain, seven; Spain, seventeen; and the United States, one.

The part of the book which treats of coal occupies some 37 pages. Only in a few instances is fine coal being treated. As a rule, flotation is being applied to refuse coal from the washeries. Some German washeries are treating over 33 tons per hour of fines and refuse. The one Dutch washery referred to is cleaning 154 tons of refuse coal hourly. Minerals Separation plants number 46, Kleinbentink plants, four; Ekof, three; Elmore-Diehl, one; and McIntosh, one, with one unstated but probably Minerals Separation.

Sizes treated frequently run up to 0.2 in. diameter. One is said to be treating coal up to 3 in. Many kinds of agents are used, including those mentioned, and beechwood oil, parellin oil, petroleum, phenol-bearing cooling water, anthracene oil, naphthalin oil, benzol wash oil, beechwood tar oil, coke-oven wash oil, succinic oil, residues from benzol factories, cresol, light oil, and phenol. Of course, the list may contain some repetitive names.

Some costs for reagents are given. They vary in Germany from 1.51c. per short ton, using beechwood oil, to 12.27c. where fresh benzol wash oil and succinic oil are used in conjunction. The total cost of flotation in the first instance is 3.66c. per short ton, the lowest of all the costs listed for German installations. The highest was at a plant using wash oil, where the reagent cost was only 5.38c., but the gross cost was 34.48c.

Publications Received

Burning Fourth and Fifth Vein Indiana Coal Successfully With Stokers at Purdue University. Joseph Harrington Co., Harvey, Ill. Bulletin H-67; 15 pp., illustrated. Results of tests with the Whiting stoker made at Purdue University on various types of stokers to determine their suitability for burning the poorer grades of Indiana coal.

Ignition of Firedamp by the Heat of Impact of Coal Cutter Picks Against Rocks, by M. J. Burgess and R. V. Wheeler. Safety in Mines Research Board. Paper No. 70; 21 pp. Price, 9d. net. Gives results of further experiments than those described in Paper No. 54, with both a bar and a chain coal cutter and with rocks of different kinds H. M. Stationery Office, Adastral House, Kingsway W. C. 2, London, England.

Low-Density Ammonia and Semi-Gelatin Dynamites. Explosives Service Bulletin, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. 6 pp.

The Corrosion of Power-Plant Equipment by Flue Gases, by H. F. Johnstone. Report of an investigation conducted by Engineering Experiment Station, University of Illinois in cooperation with Utilities Research Commission. Bulletin No. 228; 122 pp., illustrated. Price, 65c. University of Illinois, Urbana, Ill.

A Routine Test of the Inflammability of Mine Dusts, by A. L. Godbert. Safety in Mines Research Board. Paper No. 68; 10 pp., illustrated. Price, 6d. net. Simplified form of test described in Paper No. 56. H. M. Stationery Office, Adastral House, Kingsway, W.C.2, London, England.

Mineral Resources of the United States, 1928. Part I, Metals; 910 pp. Part II, Non-Metals, 801 pp. Prices, $1.50 and $1.25, respectively; cloth. U. S. Bureau of Mines, Washington, D. C.

THE BOSSES TALK IT OVER

OBTAINING DISCIPLINE—

"Mac! What's up today? First I saw Bill step off the cage before noon. And now I find you stealing home without a word for me."

"Cause and effect, I guess, Jim," laughed the foreman sheepishly. "Bill's the steadiest worker I have. But he never would take orders. I can't figure him out. Time after time I've talked to him about doing something in a little different way. He would go on with his work as if I wasn't there. My words never counted."

"He's a nice enough fellow," commented the super.

"He is, all right," continued Mac. "Well, today I visited his place and found he did not follow an ironclad order I gave him yesterday. I got mad and jumped all over him. He never batted an eye, but continued his job. That put me in a rage and I told him to take his tools and stay out until he learned obedience."

"You gave me the answer, Mac, when you said, 'I can't figure him out.' What's more, by sending him home without explaining your viewpoint to him, you've lost a good man. He won't come back."

WHAT DO YOU THINK?

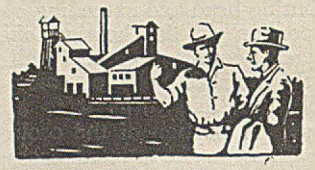
1. What are your methods for obtaining discipline?

2. How should forced layoff be administered, if at all?

3. Do you study the man's reaction to your order-giving and vary your approach accordingly?

4. What is Mac's biggest weakness in his order giving?

All superintendents, foremen, electrical and mechanical men are urged to discuss these questions. Acceptable letters will be paid for



In what order can maintenance jobs be cut? The bosses talked this over in December. What the readers think is told in the letters following:

Maintenance Necessity Pyramids When Jobs Are Put Off and Off

Maintenance work delayed means inevitably higher costs later. Maintenance costs become unusually high chiefly because the work has already been too long delayed. I will not undertake to list the different classes of this work in the order of their importance. The truth, "A chain is no stronger than its weakest link," lands a nasty kick in coal mining, and the weakening of any of the links is a signal for danger or trouble ahead.

Let us take cleaning roads, and haulage and drainage maintenance, and consider whether we can afford to neglect them, even if it is expedient in the interest of our immediate costs. In a short time we are confronted with a staggering labor and material cost on haulage and haulage equipment repairs. Rolling stock cannot be dragged over dirt, bad track, through mud and water without ruinous results, and an intermittent production usually follows in the wake of the Old Man's ill-advised policy of regulating maintenance costs.

Can he expediently postpone recovering rails and other valuable material? Some mines are blessed with good roof, and their abandoned entries and rooms do not readily cave. Others, however, are handicapped because entries and rooms begin caving as soon as they are abandoned, and it is not unusual for them to be filled with caves from one end to the other before it is expedient to recover the material. Thirty tons of good relaying rails costs $700 to $800. Assuming that from three to five tons are unavoidably lost by falls, breakage, etc., the remainder, with reasonable management, are recovered at the cost of less than fifty dollars. Sometime ago, in looking for coal in a long abandoned section of a mine, I found and estimated that approximately 150 tons of 16- to 50-lb. rail, worth about $4,000 exclusive of the ties, freight and handling charges, were almost entirely covered up with falls. A few tons of them, where the caves were light and the costs negligible, were recovered. Some of the rails were stacked in piles along the haulage, and had never been delivered to the working places.

This, incidentally, proves that the cutting down of maintenance costs did not originate in this present period of depression. It is probably as old as coal mining itself, and will persist where frankness, cooperation, and an intelligent attitude on costs are lacking in the management. The so-called expedient of postponing the upkeep of mine cars, haulage, and mining equipment, can lead only to the same disastrous end of pyramiding future costs.

Neglecting ventilation, even in mines free of explosive gas and coal dust, may sound unimportant from the standpoint of controlling costs, but clogged aircourses, poorly built stoppings, overcasts and trap doors take their toll in sickness among miners, lower efficiency, tonnage per man, and increased compensation and insurance to the coal company.

All classes of mine maintenance work must be considered as necessary and

important if the lowest consistent mine maintenance costs are desired. Can we expediently afford to neglect a timbering job costing three or four man shifts, and clean up a cave at the cost of a dozen shifts and the loss of a hundred or more tons of coal?

Maintenance costs are a business proposition, and should be handled only in a business way. If you have a good foreman he will keep you informed of the exact conditions inside. Listen to him. If you do not, the habit is contagious, and he will likely become as indifferent as yourself. If the foreman does not observe and inform you of the conditions, you do not have a good foreman. W. H. NOONE.

Davis, W. Va.

Mines Constantly Conditioned Will Pay Best in the Long Run

During times of depression it seems to be up to the management to pare operating costs. But how can this be done without endangering the future earning power of the property? Concentration of workings is one way. Another way is to clean the haulways at night, paying for this work at the rate established for loading coal.

Too many mine owners think only of today and in terms of immediate expenditures. They forget, for instance, about the impending loss of thousands of dollars tied up in materials in rib sections, which, if not recovered at the right time, will be totally lost, or recovered at great cost. The operator who keeps his mine in condition all the time is the one who will profit in the long run, for he alone is prepared to take every advantage in the business.

Brownsville, Pa. F. O. NICHOLS.

Items of Maintenance Cost Always Come Home to Roost

A questionable practice indeed is that of temporizing with maintenance costs. They are items of the production cost as necessary and legitimate as are loading and cutting. The practice of sidestepping or postponing any one of them for a period generally results in their ultimate accomplishment when they can no longer be postponed, and at a cost greater than would have been necessary had they been cared for with forethought. And, as Mac properly queries, "Do you expect better days soon?" What assurance is there that the accumulated burdens of delayed maintenance costs are going to be easier to bear in the future? These burdens have the uncomfortable habit of landing like a ton of brick at most inopportune moments. There is an old saying that if you need a thing you pay for it whether you get it or not and this applies to maintenance costs too. The one safe method to pursue to avoid such a rut is to recognize the inevitability of maintenance costs and to maintain a labor quota to keep this work up.

True, I have also observed occasions when, it seemed to me, too much stress was placed upon possible future needs. It seems unwise, at such a time as this, to make more than adequate provision for the extremely speculative future. I have in mind the maintenance of surplus development or the grading of haulageways for future need. But ten chances to one no alert mine boss is unaware of the exigencies of the times. Instead, it is my guess that he has already trimmed more than is wise and is hanging very close to the borderline of inefficiency. If ever the coal mining business is to recover a measure of stability it must do so by the stalwart avoidance of trimming or sidestepping and resolute determination to shoulder all legitimate costs.

Reductions are legitimately made only by increasing efficiency and reducing wastefulness. Too many operators are throwing rhyme and reason to the winds. Having long ago lost sight of the items of depletion and depreciation, and having cut salaries and wages to the bone, they are now working only their best and easiest mined coal and attempting to hurdle maintenance costs as well. Thus they are not only creating disaster for themselves but are dragging down the level of the whole industry. Even more poignantly than the much-ignored items of depletion and depreciation, the items of maintenance, like the proverbial chickens, come, ultimately, home to roost.

Vincennes, Ind. W. E. BUSS.

Mine Maintenance Cuts A Perennial Theme Song

The discussion between the Old Man, the super, and Mac can be duplicated in a thousand coal-mine offices throughout the country today. Nearly every coal mine has identical difficulties, differing only in degree. But in the aggregate, it will be found that if it isn't bad top, there will be water to contend with, or something just as bad. Put off pulling rails from abandoned territory and you'll eventually have to clean falls to get to them, or stand a good chance of losing them altogether. Hold off cleaning road and the rock and sand and grit will be ground into the gears of the haulage locomotives, and the cost sheet will simply be for tweedledum instead of tweedledee. Dirty road also means poor return, with resultant burned-out armatures at a time when you need them most. To skimp in timbering is indefensible at any time.

Using the last year as a criterion, the problem isn't as difficult as it sounds. In this field, the operating mines have run about half time. In other words, half the normal output on a full-time basis would amply satisfy market demands.

A certain element of maintenance is necessary all the time, such as hoisting engineers, top and bottom cagers, pumpmen, not forgetting the supervisory force, which, while not actually necessary, keeps a watchful eye on the expensive machinery underground when the mine isn't running. And this element is one big reason for costly operation. The problem could be simplified, if not solved, by the adoption of the following method: (1) Cut all daily output, compatible with market requirements, to a six-day working basis; and (2) where contract scale is still in vogue, abandon all development not actually necessary to maintain tonnage.

Panama, Ill. ALEXANDER BENNETT.

Give the Daymen Regular Work And Costs will Stay Adjusted

During these hard times we are always able to look ahead and know there will be days that the mines will not operate. The daymen are not paid a high wage scale, so, if they are to make a living wage it is necessary to furnish them continuous work.

There are many jobs, such as hanging trolley wire, bratticing, repairing main-line track, rail bonding, road cleaning, pulling track, and numerous other jobs, which can be done better and more safely while the mines are not operating. If this work is done while the mine is idle, the foreman or assistant foreman may give it closer supervision.

So why not have motor crews that can hang trolley wire, trackmen who work at the face on days the mines run and repair the main-line track on days the mines are idle? Perhaps, the electrician or his helper could be used in the mines on idle days to do the rail bonding. The timber crew could be trained to build brattices. The changes made may not necessarily be organized just as stated, but as a satisfactory crew selected from the best workers.

To accomplish this, it may be necessary to use men who are not as efficient or as fast as men regularly employed at these various jobs. However, due to closer supervision and the fact that there are no delays due to passing trips, the work may be done just as efficiently.

Diablock, Ky. LLOYD G. FITZGERALD.

All of the Bosses Are Right; Also All of Them Are Wrong

Who is right in the argument on maintenance cuts? I feel that all the bosses are right—and wrong. They are like a drowning man grasping at a straw. The Old Man knows the mine is showing up in the red every day it operates. He realizes also that to shut up shop would not eliminate the overhead, which no doubt would be as great as, if not greater than, it is when trying to operate.

The super understands that it requires a certain amount of labor to produce a ton of coal. He also knows that if the mine continues to operate, certain work must be taken care of; that if it is neglected, that work in time will eat into the heart of produc-

tion. He knows, too, that the foreman has already been passing up much work that should be done if the mine is to produce at a figure that will permit them to drag along.

Mac knows better than anyone else that he has about reached the end of the road in the way of cutting his working force. He realizes that he is now letting work pile up that later on, when it has to be done, will cost considerably more than it would now. He knows that some work has to be done which cannot be scheduled, as Dad recommends. Here is an example: Some time ago, after a shutdown of two weeks, the firebosses, on making their run for the night shift on Sunday night, discovered a 45-car fall on our Main South haulway which blocked one-third of our workings. They reported also several working places just about to destination which had started to break. The track was to be pulled out of these the following day if it was ever to be recovered. Is it possible to schedule such work as this at any mine? J. T. Reynolds.

Moundsville, W. Va.

What Price, This Expediency In Handling Maintenance Jobs

Expediency perhaps! But what price expediency? A fitting subject, this is, for industrial economists today. It appears as if the Old Man is destined to be the winner of this maintenance argument after the last has been said. There will be no recourse for the foreman but to make the necessary adjustments, a difficult job today, with mines working at a rate which is almost an irreducible minimum. As with mechanization, any further reductions must be obtained only by closer relationship and cooperation.

Briefly listing maintenance jobs, in the order of their importance, I would rank them as follows: (1) All inspection pertaining to safety of life, and correction of faults found; (2) timbering; (3) all mechanical repair work, other repair work, replacement work; (4) track; (5) recovering material; and (6) road cleaning. Along with this schedule I would suggest that the number of men for full-time operation and the number for idle time be reduced to the barest minimum. I would also recommend that a systematic plan for material distribution be drawn up. Frequent underground inspections by the officials would play an important part in my program.

Scheduling and controlling plant upkeep call for interdepartmental conferences; coordination of these departments; responsive cooperation of assistants; constant supervision; close study of comparative cost sheets; confining mechanized mining to small, well-grouped areas; limiting development to meet extraction with a little to spare; smaller outlays for materials; minimizing roof areas requiring timbering; recovering all usable material; and fostering safety and first-aid.

An annual budget controlled from day to day and broken down into cents per ton is a good plan. That method is in use at the mines of the Consolidation Coal Co. (see *Coal Age*, Vol. 35, p. 576). The key to this plan is control of the budget by the quota sheet and the daily mine-force sheet. Should tonnage during a period fall below the forecast, expenditures for improvements are correspondingly reduced, the only exception being emergency items dealing with safety. This system has the virtue of preventing abnormal inflation of monthly production costs. Thus, costs of production can be and are projected, despite uncertainties and irregularities of operation.

Frank Stank.

Taylor Springs, Ill.

How Serious Hospital Cases Are Handled in Germany

For many years a reader of your publication, I here present my solution to your last question, "Hospital Cases."

Five years ago, I had the opportunity of studying your American mining conditions, safety and first-aid methods. Now I am chief superintendent of two large coal mines in Upper Silesia and so am specially interested in these questions. My solution to your last question is as follows:

It is, in my opinion, unwise to keep an injured man in the first-aid room at all. Every accident in my mines is immediately communicated to the central telephone station. The receiver there automatically calls up the ambulance of our miners' hospital, and the ambulance is already at the door of the first-aid room when the injured man is brought up. Our fully qualified first-aid man is allowed only to test whether the injured man is still alive and, when alive, to apply artificial respiration, if necessary; to dress slight wounds; and to give one injection of "Lobelin Ingelheim" to counteract carbon-monoxide poisoning. After this, the injured man is immediately carried into the ambulance and driven to the hospital. So nobody except the first-aid man is allowed to examine the injured man. Ten minutes after being brought up from the mine, he is in the hospital. This speed can be met at any time of the day or night.

A doctor's examination at the plant, in my opinion, is useless, as the doctor has not the conveniences there for a serious operation, nor the proper assistance or medical requirements.

Dr. Repetzki.

Gleiwitz, Upper Silesia, Germany.

Is the Foreman Prepared To Meet the New Demand?

So far as possible, maintenance work ought to be scheduled. Road cleaning should be done regularly if the mine is to have safe and efficient haulage. But there is such a thing as making this job faddish by carrying it to an extreme. As for timbering, it should, in the interest of safety, be attended to immediately as needed. The same applies to the recovery of materials from worked-out places or areas. Why put a job of this kind off for a later day?

It is well to work with as small a margin of equipment and materials as possible. By so doing, idle capital is reduced to the minimum. Then the greatest use is gotten out of the equipment in the shortest period of time, and management therefore need have no qualms about obsolescence running ahead of depreciation. Money will then be available for the purchase of modern equipment.

In this constant contention between the foremen and their superiors, a weakness can be seen in the preparation of the foreman for his job. If the foreman were better versed in the procedures which lead the boss to demand curtailments in maintenance, he would certainly be in a more favorable position to guide the destinies of his management job. He knows too little about the correlation of production schedules with market demand and other considerations.

It is in this phase that the education of the foreman must be advanced. And this advancement is the responsibility of the company that employs him and of the industry at large. He must be given the opportunity to enlarge his talents beyond the realm of production methods purely. W. H. Luxton.

Linton, Ind.

Trade Literature

Electrical Equipment. Jeffrey Mfg. Co., Columbus, Ohio, has issued the following: Folder 523 describing its Standard Controllers for mine locomotive service; folder 520 covering its Continuous Steel Strip Resistance; folder No. 513 describing its Automatic Transfer Switch. These bulletins are illustrated.

Bearings. Eighth edition of price and data book of New Departure Mfg. Co., Bristol, Conn., contains revisions and additions to previous listings of types, capacities, dimensions and mounting details. The book is illustrated and has 66 pp.

Pumps. Catalog B-2 of De Laval Steam Turbine Co., Trenton, N. J., 11 pp., illustrated, describes single-stage, double-suction centrifugal pumps of horizontally split casing design.

Gears. Removable Split Rim Gears are illustrated and described in Folder No. 522 issued by Jeffrey Mfg. Co., Columbus, Ohio.

Trolleys. Folder 531, illustrated, issued by Jeffrey Mfg. Co., Columbus, Ohio, covers harps and sockets, trolley wheels, trolley base and pantograph trolleys.

Welding Rod and Equipment. Joseph T. Ryerson & Son, Inc., Chicago. Bulletin W; 8 pp., illustrated. Gives information on gas and electric welding rods, also acetylene and electric welding equipment.

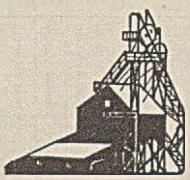
Couplings. Penn Machine Co., Johnstown, Pa. Pp. 8, illustrated. Describes the ball and socket motion of Davis flexible couplings, installation, lubrication, etc.

Breathing Apparatus. Mine Safety Appliances Co., Pittsburgh, Pa. Folder illustrating and describing the McCaa two-hour oxygen breathing apparatus.

Loading Machine. Myers-Whaley Co., Knoxville, Tenn. Pp. 12, illustrated. Includes a general description of the Whaley Automat, its shoveling mechanism, specifications, operation, and special applications.

Pipes. American Rolling Mill Co., Middletown, Ohio, has issued a bulletin on Designing Pipe Lines for Pressure; included is a graph showing the relation between pressure, diameter, and wall thickness of pipe.

OPERATING IDEAS



From Production, Electrical and Mechanical Men

Perpetual Inventory of Infringements Aids "Keep Safe" Campaign

AT THE Mather mine of the Pickands-Mather Co., a "Keep Safe" card system has been installed. The system is named from the admonition, "Keep Safe," which appears in large letters at the top of the card measuring 11x14 in., illustrated herewith. This card is put on a post in every miner's room and on the siding for motormen.

Everyone, from foreman to face worker, has a card. On it appear the check number of the employee and his working place. Space is provided for recording the violations of safety of which the man is guilty, the date of the violation, and the initials of the official by whom the annotation is made. Accidents also are recorded.

In practice anyone may mark up a card. The foreman's subordinates have the right to mark up the foreman's card if he is guilty of violating safety rules. True, that sometimes makes trouble. It may be necessary to shift a man or a foreman after the man has thus incensed his immediate superior. But the right can be and is exercised. Cards are replaced should they become spoiled.

The records on these cards are carefully preserved. If a man has a continuously bad record, he is discharged. If his past record is bad and the employee leaves, he will not be rehired should he apply for reinstatement.

At this mine when a man's place is found improperly posted he is sent home. That was not the general practice at first, because it would have occasioned resentment prior to a necessary period of readjustment, but now it is an invariable rule. He is not allowed to set the post he has failed to stand, but goes right home, and a timberman is sent to do the job. The foreman and assistants are warned not to attempt, by an exuberance of bad language, to induce the miners and others to take measures for the protection of their lives. A foreman who does so gets to be regarded as merely a scold. When he sends a man home, the mildest of language effects all the compliance.

A daily potential hazard card, measuring 4x7 in., also is provided on which are noted hazards from defective ventilation, gas, ineffective stoppings and brattice, loose roof, insufficient timber supply, explosives, electric wiring, haulage-road defects, transportation defects, imminence of fire, lack of car blocking, insufficient clearance, inadequate rock-

Fig. 1—A Card Record in Every Man's Room

KEEP SAFE!

Record of **UNSAFE PRACTICES** of-

Check No._____ **Working Place**_____

In this space the various Foremen in charge of, or inspecting the work will note unsafe practices of the workmen and violations of the rules of the Mather Collieries.

DATE	DESCRIPTION OF VIOLATION	OFFICIAL	DATE	DESCRIPTION OF VIOLATION	OFFICIAL

ACCIDENTS, IF ANY_____

RECORD FROM_____ TO_____ _____ 19__

FOREMAN

This is a Protection to

Yourself and Family

Rule 11 of the State Mining Law provides "Any person who shall deface, pull down or destroy any notice board, danger signal, general or special rules, record books, or mining laws, shall be prosecuted by the Superintendent, or notice given by the Mine Foreman or obtained from other sources, as provided for in section two of article twenty-six of this act."

MATHER COLLIERIES — **Daily Report of Potential Hazards**

No. Room	No. Entry	Ventilation	Gas	Stoppings Brattice	Loose Roof	Needs Timber	Explosives	Electric Wiring	Haulage Road	Transportation	Fire Hazard	Car Blocking	Clearance	Needs Rock Dust	Electric Machine	Other Hazards			Remarks

Key—Hazard observed —
Ordered removed +
Hazard removed ⊕

Date..... Section..... Mine Official.....

Fig. 2—An Easy Way of Keeping Track of Hazards

dusting, defective electrical machines, and other causes. The location of each hazard is noted and space is given for notes in amplification of the sign record. A hazard observed is marked with a minus sign. When it is ordered to be removed, a vertical line drawn across the minus mark, which converts it to a plus sign, indicates that fact. When the hazard has been removed, a circle is inscribed around the plus mark.

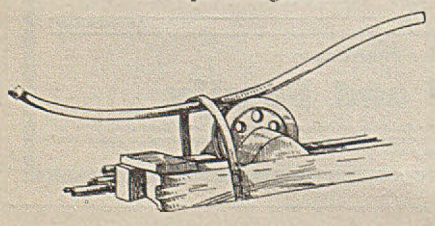
When a fireboss finds a hazard, he marks the card. The assistant foreman marks his own in a similar manner and proceeds to see that the hazard is removed. The foreman sees all the cards. Eventually they find their way to the desk of Frank B. Dunbar, the general manager, and are carefully scanned.

Simple Machine Straightens Pipe or Tube Quickly

Pipe or tubing which has been bent to conform with the requirements of a particular job, when taken out of service is too often considered to have little value for re-use. Because the material has once been bent to a shape which precludes its use "as is" for any one of the many jobs at hand is no good reason for scrapping it. Pipe and tubing up to 2 in. in diameter can be quickly straightened by hand in a simple leverage machine.

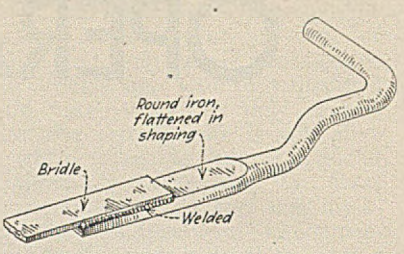
Such a machine is described by C. P. Bowie in Technical Paper 461 of the U. S. Bureau of Mines, which deals with the salvage of material in the oil industry. It is made from a sheave wheel mounted on two heavy timber sills, to which also is attached an inverted U inclined from the vertical, as shown in the sketch.

The Sheave Is the Big Trick in This Pipe Straightener



Hand Rod Safeguards Throwing Of Room Switch

In gathering territory, where it is impracticable to install throw stands at short-radius turnouts, the danger is ever present of a trip rider's hand or foot being injured because he must use these body members in setting the switch points. To avoid this danger, William Cunningham, superintendent, Linton Summit Coal Co., Linton, Ind., installs an extension rod which passes under the rail and is attached to the switch bridle. The free end of this rod, shaped as shown in the sketch, is provided with a hand hold. Attachment to the bridle bar is made by welding.



It Protects the Hands

Adding to Income

It pays to read these pages each month, for in them are contained tried and proved ideas which can be applied directly or with slight modification to some of your own problems. In so doing you take advantage of what the other fellow contributes. It is only fair, therefore, that you in return tell him the ideas you have developed. Also, it pays to send in your ideas, as you will receive $5 or more for each one accepted. This money is easily earned, granting that you have a sound and tried idea. Simply record the idea in writing and tie it in with a sketch or photograph.

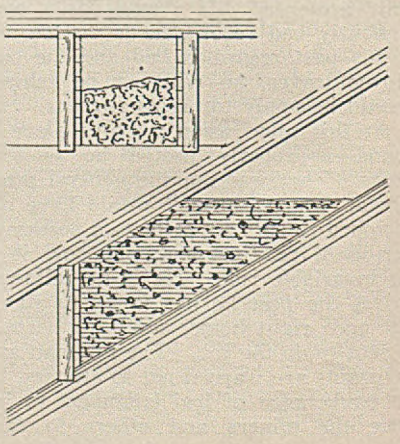
Stoppings Constructed of Silt Are Leakproof

Stoppings constructed of wood are subject to decay and shrinkage, and those of concrete, brick or tile are unyielding, and therefore likely to crack and open up in moving ground. Stoppings constructed of silt, on the other hand, will yield in moving ground and grow all the tighter when properly placed. Their low cost, efficiency, and durability should invite attention, writes Edward Morrison, Fernie, B. C., Canada.

Several stoppings of this type have been tried in the mine where he is employed. The first, erected about three years ago, measuring 10x12 ft., is intact and has shown no signs of leakage. The ventilating current measures 180,000 cu.ft. per min. against a 4-in. water gage.

To build the stopping on level ground, a backstop form of single boards and posts is erected, this serving the purpose of a seal until the permanent structure is completed. At a distance from this form, which will give the silt-wall

Above, Silted Stopping on a Level Roadway; Below, Dissimilar Construction on Dip Roadway



thickness desired, a second board stopping form is started from the bottom. This is built up gradually, or only as fill is obtained and stowed in place. The material should be rammed tight at the roof line, but in dip sections, where only one form is required, ground movements will quickly make the seal. Materials used were cleanings from near-by roads, consisting of coal particles, crushed mine rock, and limestone dust.

These were mixed with water obtained from a pump discharge located in the vicinity. The consistency of the finished mix was like mud. Sixteen hours was allowed to elapse before each addition of material.

Straight-Line Ventilation Keeps Methane Well Diffused

IN MINE ventilation, the practice of splitting the main air current so that two, three, or more sets of room headings are coursed by the same current is not without its attendant dangers. Especially is this true where non-permissible or open-type equipment is relied on for operation of the underground workings. At the Crucible mine of the Crucible Fuel Co., Crucible, Pa., which is rated as a gassy mine, this problem of safety in ventilation has been greatly simplified by a system which carries haulage roads, room entries, and the room and pillar territories on intake air in the true sense of "intake-air" terminology. Details of the system are given by the U. S. Bureau of Mines in Report of Investigations No. 3127, of which C. W. Owings, associate engineer, is the author.

This system is applicable not alone to the room-and-pillar method; it may be adopted for any panel system of mining. There also appears to be a definite place for these ventilation principles in mechanized mining, where rapid extraction often results in inadequate attention to ventilation and where the rate of methane release is greater than that from hand-loading layouts, because the time element is less. A positive current of air should pass through the working places where machinery is used.

How the air currents are guided is illustrated by the simplified ventilation map. Intake air is indicated by solid lines and return air by dotted lines. The hoisting and supply shafts are intakes, as also are the eight headings at the shaft bottom. A new airshaft was opened at the far extremity of the main entry, and the faces of 2, 3, and 4 East sections now receive air direct from it, instead of from the first-mentioned intakes, which are three miles distant.

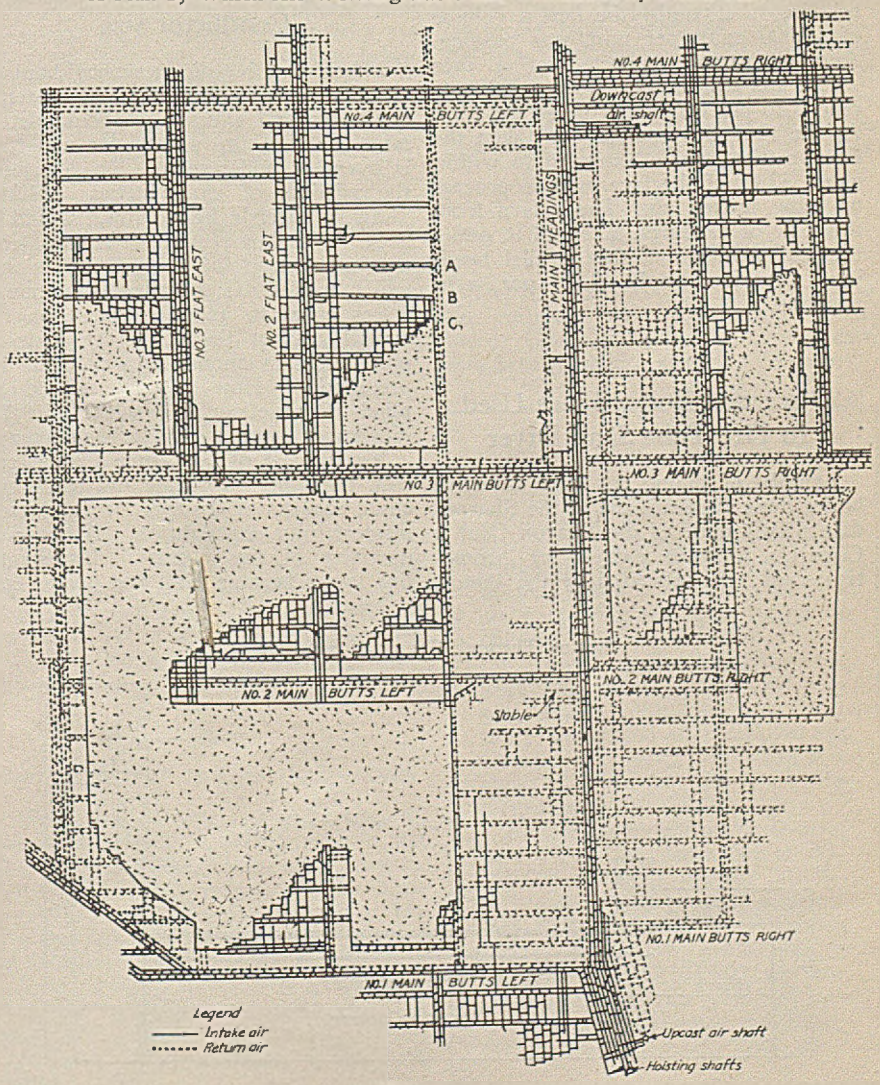
A large number of headings are made available for intake purposes by utilizing the non-working panels as returns; for example, those to the right of the main entry. By thus providing airways of large total cross-sectional area, high air velocities are eliminated except for a relatively short distance from the main upcast shaft. Frictional resistance is maintained at a low figure and water gage remains nearly constant at 3.4 in. The average volume of air circulated is about 275,000 cu.ft. per min.

As all entries from which rooms and pillars are being worked are on intake air, impurities from one pair of headings are not carried to another set of rooms. The most important feature, however, is that the caved areas are kept under positive pressure at all times. Impurities are drawn over the gob direct into the main return airways.

Consider the ventilation of 2 Flat East off 3 Main Butts. Intake air enters the 3 Main Butts Left along the two middle headings. At 2 Flat East all of the headings in the set become intakes. The butts marked *A* and *B* have been driven to intersect 1 Flat East return headings, at which intersection the regulator is opened about 5 in. of its 26-in. height. In butt *C*, where pillaring has been started, the regulator probably would be opened wide. Stoppings in the other entries outby can be knocked out, or, as they are purposely constructed of tile, roof weight may crush them. Air is pulled over the gob, out 1 Flat East, and thence to the upcast shaft.

Although this mine is advancing into virgin coal and therefore is exceptionally gassy, no accumulation could be detected over the falls in any pillar section. That the company realizes the gassy nature of the coal bed is evidenced by the employment of five firebosses to make pre-shift runs and a safety inspector to examine all working places at least once a week, sampling the air at the end of each split, also at the working faces. During the operating shift

A Plan by Which All Working Faces Are Ventilated by Intake Air



every working place is examined about once an hour.

In a test to determine the effectiveness of the ventilation, a large number of gas samples were taken at strategic and representative points. A measurement showed that the mine was liberating 1,082,000 cu.ft. of methane in 24 hr. An average of six samples taken on pillar falls showed 0.10 per cent methane. In eight samples collected in return headings from pillar workings the methane content varied from 0.04 to 0.39 per cent. Seven samples taken in returns from room workings contained 0.25 to 0.78 per cent methane; however, only three of these contained more than 0.45 per cent and two of these latter were taken in the return from face entries that had been shut down three weeks prior, because a feeder had been encountered.

It is the custom in this mine to let panels stand after they have been developed until the excess methane has been drained off. One heading face gas sample collected at the intersection of two sets of headings contained 0.58 per cent methane, although these entries had been standing idle for nearly a year. A strong velocity of air was sweeping the face, and behind a line brattice 15 ft. outby the face a volume of 19,000 cu.ft. per min. was passing. Another sample collected at a face where gas was issuing from a drillhole read 3.26 per cent methane at the roof. At the time this sample was taken the line brattice, which extended to within about 30 ft. of the face, was in process of being moved up. The return from this pair of headings, taken 20 ft. outby the last crosscut on the parallel heading, contained only 0.25 per cent methane.

Discarded Boiler Flues Used In Fire Tube Sand Dryer

Lengths of tubing cut from defective boiler flues were utilized at the Sharondale (Ky.) mine of the Sharon Coal & Coke Co. to make a dryer for locomotive sand. As indicated by the sketch, a number of boiler flues are arranged side by side to form paths for hot gases passing between a coal furnace and a stack. The tubes are about 1½ in. apart and the top surface of approximately 4x8 ft. is covered with ¼-in. mesh screen.

The raw sand is spread on top of the screen and as it drys it drops through between the tubes. The dryer is not of a type which is economical of fuel, but this is of slight importance at the present low prices of bituminous coal at the mines.

Size of Bond	Relative Cost of Bonds	500 Amp. Load	
		Power Loss per Year	Saving over 2-0 Size
2/0	$33.00	$17.25	
4/0	$39.60	$13.36	$1.78
500,000 CM	$72.60	$8.91	Loss $4.34

Determining Profit or Loss in the Selection of Bond Sizes

Determination of Economical Conductor Size

When planning new electrical haulage circuits or rehabilitating old systems, engineers and executives should determine whether the money for materials is over- or under-spent. To determine the wisdom of expenditures, Kelvin's "Law of Electric Economics," should be used. This law reads: "The most economical section for a conductor is that which makes the annual cost of power losses equal to annual interest on the capital cost of the conductor material plus necessary annual allowance for depreciation." How this law can be applied in practice is described in the November issue of *O-B Haulageways*.

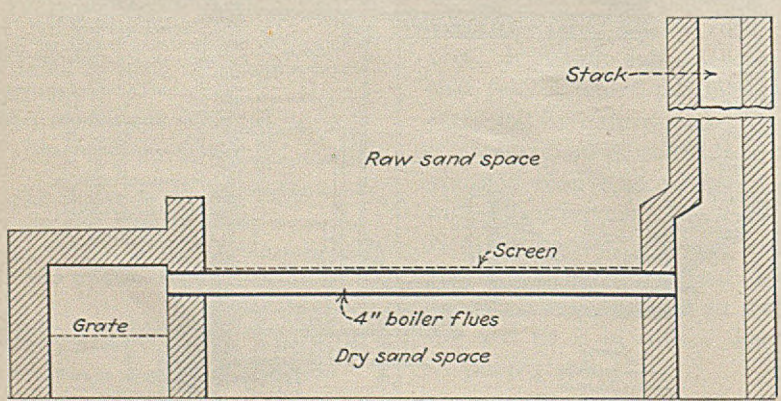
Yearly cost of operating a mine circuit, including overhead and track circuits, consists of charges for line losses, interest, and depreciation. If the conductivity of the circuit is inadequate, line losses become high and power cost at the switchboard is excessive. On the other hand, if the overhead system is built with too much copper, the rails are too heavy, and the joints overbonded, interest and depreciation charges become excessive. Therefore, a balance should be struck between the cost of line losses and the yearly fixed charges.

Care should be exercised in locating the cause of waste before corrective measures are applied. Mistaken attempts to overcome inadequate bonding by increasing the capacity of overhead circuits are not uncommon, despite the fact that overhead construction is more expensive and more difficult to maintain than the track circuit. In this case, the selection of a bond with less resistance is all that is required. On the other hand, the mistake sometimes is made of increasing the bonding capacity when the trolley and feeder system only needs additional capacity.

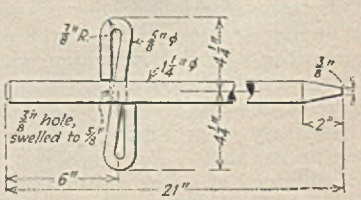
An illustration of how these mistakes can be made is presented in the accompanying chart. This predicts the power losses and savings of bonds of varying capacities on a 1,000-ft. section of track equipped with 40-lb. rail, and a total of 96 bonds It is assumed that the entry is working 300 days per year, each of eight hours, and the power cost is 3c. per kw.-hr., the load being 500 amp.

Using the 2-0 bond as an index, this chart shows that although the 4-0 bond costs more initially, it reduces the power losses per year and effects a saving over the 2-0 bond. The 500,000 circ. mil. bond is the opposite extreme and actually shows a loss due to overbonding. Between these two extremes a middle ground can be established.

Section Through Center of Sand Dryer



Design of Pit-Car Sprag Used at Operation of Stag Canyon Branch, Phelps Dodge Corporation, Dawson, N. M. It is Made of Soft Iron



WORD from the FIELD

New Plant Construction

New contracts for topworks at various operations in December and construction projects not previously reported during the year are as follows:

Fire Creek Coal & Coke Co., Fire Creek, W. Va.; contract closed with the Morrow Mfg. Co., for equipment for preparing an additional grade of coal, as follows: additions to shaker screens and conveyor for egg, nut, and slack; capacity, 125 tons per hour.

Georges Creek Coal Co., Mine No. 1, Hetzel, W. Va.; contract closed with the Morrow Mfg. Co. for additions to shaker screens, three new loading booms, rescreen conveyor, and refuse conveyor; capacity, 200 tons per hour.

Johnstown Smokeless Coal Co., Johnstown, Pa.; new screening plant, equipped with Webster Mfg. Co. screen and loading booms, completed at the No. 7 mine to load egg, nut and slack, or mine-run; capacity, 175 tons per hour.

Lillybrook Coal Co., Mine No. 3, Lillybrook, W. Va.; contract closed with the Morrow Mfg. Co. for equipment for preparing an additional grade of coal, as follows: additions to shaker screens, new loading boom for stove, and new belt conveyor for slack; capacity, 300 tons per hour.

Middle Creek Coal Co., Bickmore, W. Va.; contract closed with the Morrow Mfg. Co. for equipment for preparing an additional grade of coal, as follows: additions to shaker screens, loading boom for nut, and scraper conveyor for slack; capacity, 125 tons per hour.

Pittsburgh Coal Co., Euclid mine, Smithton, Pa.; contract closed with the Morrow Mfg. Co. for additions to shaker screens, rescreen conveyor, and loading boom; capacity, 300 tons per hour.

Pittsburgh Coal Co., Midland mine, Houston, Pa.; contract closed with the Morrow Mfg. Co. for loading boom, extension to old boom, and refuse conveyor; capacity, 400 tons per hour.

Producers' Mining Co., Belmont Smokeless mine, Acosta, Pa.; installation of new screening and loading equipment completed, as follows: shaker screen, picking table, slack conveyor, and loading boom for producing lump, slack, or mine-run; capacity, 600 tons per day.

W. J. Rainey, Inc., Clyde No. 2 mine, Uniontown, Pa.; contract closed with the American Coal Cleaning Corporation for a plant to re-treat $\frac{1}{8}$x0-in. coal; capacity, 30 tons per hour. Equipment consists of one Type RA pneumatic separator, Hum-mer screens, dust-collecting equipment, and other auxiliaries.

Utilities Elkhorn Coal Co., Boldman, Ky.; contract closed with the Morrow Mfg. Co. for equipment for preparing an additional size, as follows: additions to shaker screens, rescreen conveyor, loading boom, and belt conveyor; capacity, 200 tons per hour.

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Expect Drop in Coal Shipments

Shipments of coal and coke are expected to drop to 1,970,859 cars in the first quarter of 1932, according to estimates submitted by shippers to the Shippers' Regional Advisory boards. This is a decline of 5.6 per cent from the total of 2,088,414 cars shipped in the first quarter of 1931. Shipments of all commodities, including coal and coke, are expected to show a decline of 6.6 per cent from the 1931 figure in the first quarter of 1932.

Hoover Helps Unemployed Engineers

President Hoover has donated $5,000 to the Professional Engineers' Committee on Unemployment, and has expressed his willingness to help the committee further in its efforts to relieve unemployment among engineers. The committee was organized a short time ago by the New York sections of the American Society of Civil Engineers, American Institute of Mining and Metallurgical Engineers, American Society of Mechanical Engineers, and the American Institute of Electrical Engineers. Approximately 200 unemployed engineers have registered at the committee's headquarters at 29 West 39th St., New York, and more than $37,000 has been raised, with additional pledges for a considerable sum. The committee seeks $200,000 to carry out its program.

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Rate Rise Effective

The increase of 6c. per ton granted to the railroads by the Interstate Commerce Commission in the 15 per cent rate case went into effect on Jan. 4.

Coal Output Drops in 1931

Bituminous coal production was 378,110,000 net tons in 1931, according to preliminary figures compiled by the U. S. Bureau of Mines. This is a decline of 19.1 per cent from the total output of 467,526,000 tons in 1930, and is the lowest production since the year 1909, when 379,744,000 tons was mined. Anthracite production is estimated at 59,531,000 net tons for the year 1931, which is a drop of 14.2 per cent from the 1930 total of 69,385,000 tons.

Soft-coal production in December, 1931, was estimated at 30,260,000 net tons, against 30,110,000 tons in the preceding month and 40,222,000 tons in December, 1930. Anthracite production in December was 4,671,000 net tons. This compares with 4,141,000 tons in the preceding month and 6,050,000 tons in December, 1930.

Coal Age was founded in 1911 by the Hill Publishing Co. In 1915 *Colliery Engineer,* with which *Mines and Minerals* previously had been consolidated, was absorbed by Coal Age.

When, in 1917, the Hill Publishing Co. and the McGraw Publishing Co. were consolidated to form the present McGraw-Hill Publishing Co., Coal Age became a member of this larger publishing enterprise. On July 1, 1927, the journal was changed from a weekly to a monthly.

During twenty years the editorship has been held successively by Floyd W. Parsons, R. Dawson Hall, C. E. Lesher, John M. Carmody and Sydney A. Hale. The editorial staff of Coal Age consists of: Sydney A. Hale, R. Dawson Hall, J. H. Edwards, Louis C. McCarthy, Ivan A. Given, and A. F. Brosky.

Ratify Southern High-Volatile Sales Agency; Ohio Committee to Draw up Plan

APPROVAL of the charter for Appalachian Coals, Inc., a central sales agency for the Southern high-volatile fields as well as the form of contract between producer and sales company, the form of contract between the sales agency and the sub-agents, and the form of the stock subscription contract, were the principal items of business at a meeting of 151 executives of sales and producing companies mining or distributing coal from the Harlan, Hazard, Big Sandy, Southern Appalachian, Williamson, Kanawha, Logan, and Southwest Virginia districts. This meeting was held at the Hotel Sinton, Cincinnati, Ohio, Dec. 30.

A conference of those operators whose companies have tentatively subscribed for stock in the new sales agency will be held in Cincinnati on Jan. 27, at which time each producer will decide whether or not on the basis of the tonnage signed up he desires to become a party to the formation of Appalachian Coals, Inc. An intensive drive throughout the eight high-volatile fields will be made in the intervening weeks to obtain a sufficient tonnage to assure the success of the corporation. The following directors were tentatively appointed at Cincinnati, pending approval of the formation of the sales agency: W. J. Magee, Carbon Fuel Co., Cincinnati; Calvin Holmes, Holmes-Darst Coal Co., Cincinnati; Burke H. Keeney, Middle West Coal Co., Cincinnati; Charles R. Moriarty, Cabin Creek Consolidated Coal Co., Cincinnati; J. D. Francis, Island Creek Coal Co., Huntington, W. Va.; and E. C. Mahan, Southern Coal & Coke Co., Knoxville, Tenn.

In Ohio, the organization committee appointed at the conclusion of the New York meeting of National Coal Association directors, Dec. 3, at which the sales agency plan was approved, met with a number of operators at Cleveland, Dec. 22, and, after receiving a report from a subcommittee that opinions of three lawyers were in agreement that the Ohio anti-trust act will not interfere with the formation of a regional sales agency, adopted the following motion:

It was moved that this meeting accept and indorse the principle of the regional sales agency plan, as approved at the New York conference, Dec. 3, 1931, and that the subcommittee appointed by the chairman at our last meeting be continued and asked to prepare, in as much detail as it may deem wise and necessary, a plan showing the form of organization which should be set up to make the regional sales agency plan effective in the State of Ohio.

The subcommittee referred to in the motion is composed of the following: Wm. Emery, Jr. (chairman), Cambridge Collieries Co.; Geo. K. Smith, Sunday Creek Coal Co.; R. L. Ireland, Jr., Hanna Coal Co.; S. B. Johnson, Lorain Coal & Dock Co.; and W. L. Robison, Youghiogheny & Ohio Coal Co. When the subcommittee is ready to report, another meeting of the general committee will be called, and if the plan submitted by the subcommittee is approved, then a general meeting of all operators in Ohio will be called, at which the plan will be submitted.

Fifty-six representatives of operators and distributors in Indiana met at Terre Haute, Dec. 15, under the chairmanship of R. H. Sherwood, chairman, Coal Trade Association of Indiana, and president, Central Indiana Coal Co. Mr. Sherwood explained the sales agency plan, after which it was decided that action would be held in abeyance pending further individual study. For this reason, the meeting was adjourned subject to call within 30 days.

Central Pennsylvania committee men held two meetings in December with Charles O'Neill, vice-president, Peale, Peacock & Kerr, Inc., presiding. At both meetings, discussion centered on the preliminaries to be ironed out before the plan is submitted to the producers in the field. In Western Pennsylvania, J. D. A. Morrow, head of the committee in that region, called a meeting of that body for Jan. 6 to consider the plan. Northern West Virginia operators were called to a meeting in Fairmont, W. Va., on the same date by C. H. Jenkins, vice-president, Hutchinson Coal Co., to discuss adoption of the plan. The West Kentucky organization committee met at Madisonville, Ky., Dec. 29, and approved the sales agency plan in principle, though it was decided to recommend a number of modifications to a meeting of operators to be held in the same city on Jan. 5.

Characterizing the efforts of the general committee which proposed the sales agency plan at the Dec. 3 meeting in New York City as an attempt "to find a northwest passage around the anti-trust laws," Henry Warrum, general counsel, United Mine Workers, addressed an analysis of the plan and a protest against its adoption to Secretary of Labor Doak on Dec. 14. Basing his declarations on the report of the general committee and upon the provisions of the proposed contracts between producers and agents or producers and subagents, Mr. Warrum declared that "The actual situation created by this scheme is nothing but a concerted price fixing," and that "the only object of the whole plan is to secure by the agreement and combination a possible limitation on production and an assured uniformity of prices." The fourth section of the proposed contract between producers and the sales agent furnishes "the machinery for limiting production," Mr. Warrum declared.

"The plan has been agreed upon by the association of producers, and is therefore a combination between them . . . It has been repeatedly laid down by our Supreme Court that the anti-trust laws are violated by any agreement, plan, association, combination, or understanding between those engaged in the same business, the effect of which is to secure, directly or indirectly, harmonious action between the parties in relation to the regulation of prices or the limitation of production." Mr. Warrum declared that the whole purpose of the plan, in so far as it refers to mergers and marketing pools, is provided for in the Miners' Bill (the Watson Bill). He charged that the reason why the operators refused to support the bill was based on two provisions of the bill: first, that the prices charged "shall be fixed with due regard to fair wages paid for the production of coal and a fair return on the capital invested"; and, second, that mine labor in negotiating for its wage scale "shall be entitled to deal collectively by representatives of their own choosing without interference, influence or coercion exercised by their employers."

The Chamber of Commerce of the United States, after a poll of its members, made public on Dec. 18 a program of business and employment stabilization containing provisions for modification of the anti-trust laws and relief for the natural-resource industries. Four main proposals for the promotion of economic stability were made as follows:

The setting up by business itself of a national economic council to aid all fields of industry, finance and commerce in their planning; modification of the anti-trust laws to make clear lawfulness of agreements intended to relate production to consumption; relief in emergencies for the natural resource industries, such as coal,

Hoover Again Urges Inquiry Into Anti-Trust Laws

Inquiry into the workings of the anti-trust laws was again recommended to Congress by President Hoover in his message of Dec. 8. The President included the same recommendations in his message of Dec. 2, 1930, and stressed particularly the plight of the natural-resource industries. He reaffirmed the necessity for action in his message last month, as follows:

"In my message of a year ago, I commented on the necessity of Congressional inquiry into the economic action of the anti-trust laws. There is wide conviction that some change should be made, especially in the procedure under these laws. I do not favor their repeal. Such action would open wide the door to price fixing, monopoly, and destruction of healthy competition. Particular attention should be given to the industries founded upon natural resources, especially where destructive competition produces great wastes of these resources and brings great hardships upon operators, employees, and the public.

"In recent years there has been a continued demoralization in the bituminous coal, oil, and lumber industries. I again commend the matter to the consideration of Congress."

oil and lumber, by the creation of a government tribunal which would permit agreements for curtailment of production when in the public interest; and establishment of privately sustained systems of unemployment benefits as well as other similar benefits based upon definite reserves previously established.

Government control of the coal industry through the power of the Interstate Commerce Commission to control freight rates and car distribution, which frequently has been suggested, is at best only a "palliative to the ills of the industry," declared the National Industrial Conference Board, Inc., Dec. 9, in an analytical report on "The Competitive Position of Coal in the United States." Constitutional limitations on the powers of the federal government make it necessary to look in a different direction for the solution of the ills of the industry. Reconstruction of the industry from within is recommended by the board, which holds present overdevelopment and resulting competitive conditions will enforce the formation of fewer and larger units at the expense of the smaller. If the final outcome is the elimination of inefficient producers and distributors, uncontrollable production, and destructive competition, "the results of mergers and consolidations will be worth the price that must be paid."

The original Watson Bill (S. 2888), which was before two Congresses, was in the process of being revised in December by Senator Davis and Representative Kelly, both of Pennsylvania, and others. Little progress was being made, Senator Davis declaring that "we are not in agreement among ourselves yet. The bill will not be in shape to be introduced until after the Christmas recess, if then. When it is introduced, I shall seek to have it referred to the Committee on Mines and Mining, of which I am a member, and I hope to have hearings upon it before that committee."

Natural Gas Sales Down

Sales of natural gas reported to the American Gas Association by companies representing 90 per cent of the utility distribution totalled 549,985,192,000 cu.ft. in the first ten months of 1931, a decline of 9 per cent from the total of 605,192,164,000 cu.ft. in the same period in 1930.

Work on the natural-gas pipe line from the Tioga field of Pennsylvania to Syracuse, N. Y., was virtually completed at the end of the year, and plans for extending it to Oswego and other New York and New England cities are up for discussion in 1932. Capacity of the Syracuse line is 10,000,000 cu.ft. per day.

Jerome Drumheller, Spokane, Wash., has asked the Idaho Public Utilities Commission for permission to acquire a right-of-way for a line from Cutbank, Mont., to Spokane.

North Dakota authorities received a request in December for permission to extend the gas lines of the Montana-Dakota Power Co. from Williston to Minot, N. D., and other cities along the Canadian border.

Kentucky Strike Call Meets Little Response; Smokeless Wages Cut

THE strike in Harlan, Knox, and Bell counties, in southeastern Kentucky, called by the National Miners' Union got under way on Jan. 1 with little response from the miners and without disorders. Thirty-five mines in Harlan County were reported to have operated on Jan. 1, while seven mines were closed down on account of lack of orders. In Bell County, two mines were shut down, three went to work with about half normal forces, and two others operated full strength. Four mines were closed down in Knox County, and it was announced that they would not reopen until the demand for coal increased, and that when they did resume operation non-union labor would be employed. Miners held mass meetings throughout the field and pickets were present at a number of mines.

Preparations for the strike resulted in the death of Owen Sizemore, a Harlan County deputy sheriff, at Chevrolet on Dec. 26. Sizemore was shot when he and another deputy attempted to prevent the distribution of literature concerning the strike by Vergil Hutton. Hutton was arrested and charged with murder, and Mike Hall and Leonard Farmer were taken into custody on the charge of aiding and abetting Hutton.

W. B. Jones, secretary of the Evarts local of the United Mine Workers, was convicted of conspiracy to commit murder as the result of a shooting at that city on May 5, in which four men, including a deputy sheriff, were killed. Jones was tried in the Mt. Sterling (Ky.) court, and was sentenced to life imprisonment in December. William Hightower, president of the Evarts local, went on trial on a similar charge on Dec. 28, when defense attorneys were unsuccessful in an attempt to get the case taken back to Harlan County.

The New River Coal Operators' Association and the Winding Gulf Operators' Association announced wage reductions on Dec. 28 to take effect in Fayette, Releigh, Boone, and parts of adjoining counties in West Virginia on Jan. 1. Cuts were as follows: machine runners, $5.45 to $4.64 per day; helpers, $4.70 to $4; motormen, $4.68 to $4.16; and brakemen, $4.10 to $3.84. Tonnage rates for loading on machine or pick-mining sections, yardage, and other classes of work were reduced accordingly, and though the rates were not announced it was estimated that the cut would be approximately 10 per cent. About 15,000 miners will be affected by the order. General economic conditions, competition of subsitute fuels, both foreign and domestic, and inability to retain foreign markets were given as the reasons for the reduction.

Eight hundred Henryetta (Okla.) miners returned to work on Dec. 11, ending a walkout which began on Nov. 2 in protest against wage cuts from $5 to $3.60 for day labor and from 83½c. to 60c. per ton for tonnage work; the inauguration of a task system for loaders; and the refusal of the operators to collect payments for checkweighmen or to meet the miners to adjust grievances. These were the causes of the stoppage as determined by the State Board of Arbitration and Conciliation, which investigated the strike. The task, as given by the board, was 8 tons per day. The board recommended that: the "inhunian" task system be abolished; that all men who quit work on Nov. 2 be reemployed; that the operators collect payments for checkweighmen; that there be no discrimination against union members; and that the reduced rate of pay be retained until the end of the present season, when steps should be taken to solve the problem before next season. Members of the United Mine Workers dropped their demands for union recognition on Dec. 10 in lieu of an investigation by the board, but picketed the mines when work was resumed on Dec. 14. Two homes were dynamited at Deward on the same day.

Eleven union miners from Richmond, Mo., were charged with assault on a weighboss and two non-union men as a result of disorders which accompanied an attempt to reopen mines in the Richmond field on a reduced scale of $3.60 a day, against the former rate of $5 asked by union representatives, who are attempting to organize the region. Five mines were idle in the district in December because of wage disputes.

The executive board of District 12, United Mine Workers, comprising the State of Illinois, last month refused the request of miners from Edwardsville for permission to operate a mine on a cooperative basis. It is understood that the board will investigate nine mines at Belleville which are alleged to be operating under the cooperative plan.

The scale committee of the United Mine Workers was reported to be trying in December to arrive at rates for the Hocking and Pomeroy fields of Ohio. Operators, however, are running open shop, and paid little attention to the deliberations of the committee, which recently denounced both the non-union plan and a committee of 100 business men formed to aid the industry.

The deadlock between the Dominion Steel & Coal Corporation, Ltd., which insists on wage cuts varying from 10 to 33 per cent upon the expiration of the present contract on Jan. 31, 1932, and members of the United Mine Workers, who refuse to accept the reductions, was the subject of conferences called by Nova Scotia authorities in December. The financial and operating position of the company in relation to the scale of wages paid was considered at the meetings, with the result that province officials will appoint a royal commission to investigate the industry and make recommendations for the settlement of the dispute. In the meantime, the present contract is extended to March 1.

Indiana Institute Organized

Forty Indiana coal and safety men formed the Indiana Coal Mining Institute at a meeting in Terre Haute, Ind., Dec. 12. The institute will promote safety and efficiency at Indiana mines by encouraging education in mining, advancing study and research in mining problems, and by fostering the organization of foremen's clubs at mines within the state. John Hessler, general superintendent, Fort Harrison Mining Co., Terre Haute, was elected president, and other officers were chosen as follows: vice-presidents — Wesley S. Harris, Bicknell, president, Bicknell Coal Co.; James White, Sullivan, division superintendent, Peabody Coal Co.; and P. L. Donie, Linton, vice-president, Little Betty Mining Corporation; secretary-treasurer, Harvey Cartwright, Terre Haute, commissioner, Indiana Coal Operators' Association.

Shotfirers' Dispute in Court

Union Colliery Co., operating a mine at Dowell, Ill., has been charged with violating the Illinois shotfirers' law in a complaint filed by State Attorney Fletcher Lewis in the Jackson County Court, Carbondale. The complaint was sworn to by J. T. Millhouse, director, Illinois Department of Mines and Minerals, and alleges that the shotfirers employed in the mine were required to do other work than inspection of holes and firing of shots. The case, it is expected, will test the validity of the statute, going to the Illinois Supreme Court for final decision. Some months ago, Attorney General Oscar Carlstrom ruled that a shotfirer is prohibited by law from drilling holes or doing other work about the mines in addition to inspection of holes and firing.

Committee of Ten Activities

Birmingham (Ala.) solid fuel and heating equipment men met in that city early in December, under the chairmanship of James L. Davidson, secretary of the Alabama Mining Institute, and took steps toward the formation of a local association to cooperate with the Committee of Ten—Coal and Heating Industries.

The Kanawha Coal Utilization Committee to promote the use of coal in Charleston, W. Va., and vicinity, was formed at a meeting in that city early in November. The new organization, which will cooperate with the Committee of Ten, is headed by D. C. Kennedy, secretary, Kanawha Coal Operators' Association. A. O. Wilson, statistician of the operators' association, is secretary.

Knoxville (Tenn.) solid fuel and equipment men voted to form a local association to cooperate with the Committee of Ten at a meeting in that city early last month. R. E. Howe, secretary, Southern Appalachian Coal Operators' Association, was named chairman of the organization committee.

Permissible Plates Issued

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

(1) Joy Mfg. Co.; Type 8-BU loading machine; 15-hp. motor, 250 volts, d.c.; Approval 235; Nov. 27.

(2) Jeffrey Mfg. Co.; Type MM52-C conveyor; 7½-hp. motor, 230 volts, d.c.; Approval 236; Nov. 19.

Retailers Discuss Trucking

Trucking from anthracite mines to towns within 50 miles was discussed at a meeting of the Pennsylvania Retail Coal Merchants' Association, held at Reading, Pa., Dec. 17, to draw up a plan for combating the growing use of trucks. Suggestions were made that freight rates be reduced, that operators reduce their prices to dealers with rail connections or increase them to truckers, or that the retailers go into the long-distance trucking business themselves or hire facilities for this purpose. No action was taken at the meeting, with the exception of the adoption of a resolution for the appointment of a committee to confer with the operators and railroad officials.

Coal Aid Group for Ohio

Southern Ohio business men to the number of 125 met at Nelsonville, Ohio, late in December, and formed the Hocking and Sunday Creek Valley Business Men's League to better the operation of the mines in their section. A committee was named to investigate the problems facing the field and report back at a future meeting. Members of the committee are: Barton A. Holl and Ferd Hack, Logan; C. C. Bennett and Rev. Lloyd Evans, Nelsonville; C. M. Gill and Gordon K. Bush, Athens; John Lovett and Louis Seidenfield, Murray City; and L. E. Richardson, Glouster.

Safety Drive Started in Ohio

Ohio coal operators, the Ohio Division of Mines and Minerals, and the Division of Safety and Hygiene of the Ohio Industrial Commission are cooperating in a three months' safety campaign to cover all mines in the state. The drive began on Jan. 1. Prizes, based on the tonnage produced, will be awarded to the leading operations at the All-Ohio Safety Congress, to be held in Columbus, April 19. Winners will be calculated in accordance with the following formula: lost-time accidents of less than seven days' duration, one point; more than seven days, three points; accident involving broken bones, five points; permanent injury, ten points; and total disability or fatality, twenty points.

Loading-Machine Case Settled

Final settlement of the patent suit case brought by the Joy Manufacturing Co. against the Herzler & Henninger Machine Works, in which the court held the Wilson loading machine built by the defendant infringed on the Joy patent (see *Coal Age*, Vol. 35, p. 502), was effected last month. Under the terms of the agreement, the Joy company is licensing the continued use of the Wilson loaders wherever they are installed at the present time. This licensing does not authorize a rebuilding of such machines, but does permit the Herzler & Henninger company to supply ordinary repair parts so that the machines may be kept in service by such making of ordinary repairs. The license granted by Joy extends to the use by each purchaser and direct successor in business and privities in title to their coal mining properties, but does not include a right to resell the machines.

The agreement further provides, it is announced, that the defendant company will send to each user of the loaders referred to in the final agreement, a letter specifying the serial numbers of the machines in the hands of the respective users and advise them that the construction of their machine was held to be an infringement of U. S. Letters Patent 1306064 owned by Joy, and that after the court found infringement, defendant settled the litigation by paying a substantial consideration, which consideration also provided for the future use of the machines by purchasers from Herzler & Henninger.

Anthracite Engineers Meet

Progress in the electrification of anthracite mines was the theme of an address by W. H. Lesser, combustion and mechanical engineer, Penn Anthracite Mining Co., at the meeting of the Lehigh Section, American Institute of Electrical Engineers, held in Pottsville, Pa., Dec. 10. Mr. Lesser was of the opinion that the increase in electrification would solve the question of reduced cost of producing coal. Utilization of switches and circuit breakers was discussed by A. R. Miller, Lehigh University, Bethlehem, Pa. Over 125 men were present at the meeting.

Alaskan Anthracite Reserves Revealed by Survey

Alaskan anthracite reserves estimated at several million tons were found in the upper Matanuska Valley last summer as the result of geological work under the direction of the Alaska R.R., which is controlled by the U. S. Department of the Interior. A half a million tons of coal was located under Anthracite Ridge proper, but the structural and topographic conditions make extraction improbable. Reconnaisance of the region between the ridge and the Matanuska River indicated, however, that the beds extend into this area, which is more susceptible to mining.

Personal Notes

C. F. RICHARDSON, president, West Kentucky Coal Co., Sturgis, Ky., was elected district vice-president of the National Rivers and Harbors Congress at the annual meeting in Washington, D. C., in December. M. L. GARVEY, president, Fire Creek New River Coal Co., Charleston, W. Va., was elected a director from West Virginia.

HARRY L. GANDY, New York City, for seven years secretary of the National Coal Association, has been elected president of the Sheridan-Wyoming Coal Co., operating mines at Acme and Monarch, Wyo. Mr. Gandy retains his position as president of Pittston Coal, Inc. MICHAEL GALLAGHER, New York City, former president of the Sheridan-Wyoming company, continues as chairman of the board. C. R. NASH, vice-president of Pittston Coal, Inc., was elected vice-president of the Sheridan-Wyoming organization.

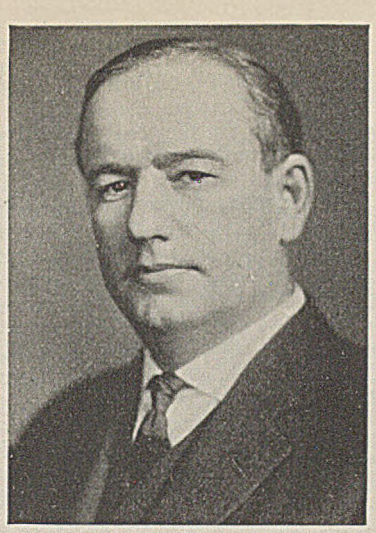
FRED A. GRAF, for two years assistant engineer at the Winton (Wyo.) mine of the Union Pacific Coal Co., has been made research engineer for the company. Mr. Graf was born in Elberfeld, Germany, and was employed by the German government to make a comparison of mines in that and surrounding countries.

R. R. ESTILL, formerly superintendent of the Kingston Pocahontas Coal Co., Hemphill, W. Va., has been appointed safety director for the West Virginia Department of Mines, succeeding Walter R. Perfater, Welch, W. Va., transferred to the Cabin Creek and Coal River districts.

CHARLES DORRANCE, consulting mining engineer, Scranton, Pa., was elected president of the Penn Anthracite Collieries Co. and subsidiaries on Dec. 15. Mr. Dorrance succeeds R. H. BUCHANAN, who will devote his time to his interests as president of the Northumberland Mining Co. and vice-president of the Payne Coal Co.

W. A. RICHARDS, president, Majestic Collieries Co., Bluefield, W. Va., has been appointed representative of the National Coal Association on the committee for testing sieves of the American Standards Association.

Five Pittston Coal Co. men received new assignments and three positions were abolished in a program of personnel changes put into effect at the end of December. WILLIAM KEISER was appointed superintendent of the electrical and mechanical department, with headquarters at Dunmore, Pa.; L. P. READ was appointed maintenance foreman in the department. NORMAN SMILES, assistant superintendent, Pittston No. 9 colliery, Pittston, was promoted to the position of superintendent at Ewen colliery, Pittston. C. C. KING, assistant superintendent at Ewen, succeeds Mr. Smiles. ROBERT SHEPPARD, assistant at Pittston No. 6 colliery, in the same city, takes Mr. King's place at Ewen. The position of consulting electrical and mechanical engineer, held by JAMES A. ERSKINE, was abolished, as were the positions of assistant superintendent at Butler colliery, Pittston, held by MILES CAREY, and Pittston No. 6 colliery.



Harry L. Gandy

WALTER CURRAN MENDENHALL has been appointed fifth director of the U. S. Geological Survey, Washington, D. C., succeeding George Otis Smith, now chairman of the Federal Power Commission. Mr. Mendenhall has been connected with the Survey for more than 30 years, and was in charge of ground water investigations from 1907 to 1910. He became chief geologist of the Survey in 1922.

PROF. H. G. TURNER has joined the faculty of the School of Mineral Industries of the Pennsylvania State College, State College, Pa., as research associate in fuel technology. Prof. Turner also is director of research for the Anthracite Institute, and will continue his research work in the School of Mineral Industries laboratories.

Coming Meetings

Hazard Coal Operators' Exchange; annual meeting, Phoenix Hotel, Lexington, Ky., Jan. 15.

American Institute of Electrical Engineers; annual winter convention, 33 West 39th St., New York City, Jan. 25-29.

American Society of Heating and Ventilating Engineers; second exposition, Cleveland, Ohio, Jan. 25-29, 1932.

American Wood Preservers' Association; annual meeting Jefferson Hotel, St. Louis, Mo., Jan. 26-28.

Eastern Ohio Operators' Association; annual meeting Cleveland, Ohio, Feb. 8.

American Institute of Mining and Metallurgical Engineers; annual meeting, 29 West 39th St., New York City, Feb. 15-18.

Industrial Notes

GOODMAN MFG. CO., Chicago, has purchased the business and good will of the Conveyor Sales Co., New York City, and will manufacture and sell the "Cosco" line of conveyors and other mining equipment.

CHESTER H. LANG, formerly assistant manager, has been appointed manager of the publicity department of the General Electric Co., Schenectady, N. Y., vice Martin P. Rice, retired. Mr. Lang entered the employ of the company in 1919. JOHN ANDERSON, assistant to J. G. Barry, vice-president, has been appointed secretary of the sales committee of the General Electric Co. Mr. Anderson, whose first connection with the company was in 1910, succeeds E. G. Waters, retired.

T. M. CHANCE, of H. M. Chance & Co., Philadelphia, Pa., announces the appointment of ARTHUR G. McKEE & Co., engineers and contractors, Cleveland, Ohio, as the sole licensors of the Chance sand flotation process for the states of Indiana, Illinois, Kentucky, Tennessee, and Alabama. The McKee company has organized a department for the design and construction of coal preparation plants.

WEIR KILBY CORPORATION, Cincinnati, Ohio, has acquired the Cincinnati Frog & Switch Co., Cincinnati. CHARLES H. PARTINGTON has resigned as president of the Cincinnati company, and is succeeded by O. DEG. VANDERBILT, JR., president of the Weir Kilby company.

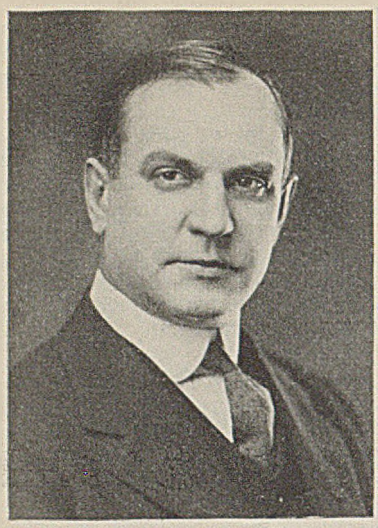
ROCKBESTOS PRODUCTS CORPORATION, New Haven, Conn., has appointed MERTON R. SUMNER as manager of the Chicago sales office. Mr. Sumner was formerly with the Byllesby Engineering & Management Co., Pittsburgh, Pa.

ROBERT H. MORSE, formerly vice-chairman of the board of directors, has been elected president and general manager of Fairbanks, Morse & Co., Chicago, succeeding W. S. Hovey, resigned. Mr. Morse entered the employ of the firm in 1895.

LINCOLN ELECTRIC CO., Cleveland, Ohio, has appointed R. D. EAGLESFIELD, a former manufacturer of motor-driven machinery, as district manager in charge of motor and welder sales, with headquarters in the Architects & Engineers Building, Indianapolis, Ind. The Lincoln company has removed its New York office to the McGraw-Hill Building, 330 West 42d St.

FUERST-FRIEDMAN CO., Cleveland, Ohio, specializing in the rebuilding, rental, and repair of electrical machinery and equipment, has changed its name to the ELECTRIC GENERATOR & MOTOR CO.

CATERPILLAR TRACTOR CO., Peoria, Ill., has appointed the following as assistant sales managers: J. N. BARNES, formerly district representative at Macon, Ga.; C. M. BURETTE, recently with the Hyatt Roller Bearing Co. and the Sharples Cream Separator Co.; and F. G. NUNNELLY, Canadian sales representative for several manufacturing companies.



The Late Thomas W. Dawson

Thomas Dawson Dies

Thomas W. Dawson, 55, vice-president of the H. C. Frick Coke Co., died at his home near Scottdale, Pa., Dec. 19, after an illness of several months. Mr. Dawson entered the employ of the Frick company in 1901 as a draftsman, and was successively division engineer, assistant chief engineer, and chief engineer, until his election to the vice-presidency in July, 1927.

Associations

MEMBERS of the Winding Gulf Coal Operators' Association, at the annual meeting held in Beckley, W. Va., last month, elected A. W. Laing, Charleston, W. Va., vice-president, Morrison Coal Co., president for the coming year. Other officers were chosen as follows: vice-president, L. T. Putman, Beckley, general superintendent, Raleigh-Wyoming Mining Co., and secretary-treasurer, P. C. Graney, Mt. Hope, W. Va., general manager, C. C. B. Smokeless Coal Co.

R. H. MORRIS, general manager, Gauley Mountain Coal Co., Ansted, W. Va., was elected president of the New River Coal Operators' Association at the annual meeting held at Mt. Hope, W. Va., Dec. 5. Other officers are: vice-president, R. J. Burmeister, general manager, Raleigh Coal & Coke Co., Raleigh, W. Va.; treasurer, P. M. Snyder, president, C. C. B. Smokeless Coal Co., Mt. Hope; and secretary, Stanley C. Higgins, Mt. Hope (re-elected).

JAMES B. SMITH, San Francisco, Calif., president of the Spring Canyon Coal Co. and the Royal Fuel Co., was elected president of the Utah Coal Producers' Association last month, succeeding the late W. D. Brennan. Mr. Smith has represented the Utah and Wyoming associations on the directorate of the National Coal Association for more than two years.

John S. Brophy Dies at Office

John S. Brophy, 65, president of the Piedmont & Georges Creek Coal Co. and a leader in the coal industry in Maryland for many years, died of heart disease at his office in Frostburg, Dec. 14. Mr. Brophy began his career as a coal man at early age, as an employee at mines in the vicinity of Elk Garden, W. Va., and later completed a mining course at Ohio State University. Shortly after his graduation, he began the recovery of coal from abandoned workings at Eckhart, Md., and later considerably extended his work in this direction. He also was one of the pioneers in the development of the Tyson seam, and in 1919 and 1920 served on a commission of operators and miners' representatives in the settlement of disputes in the Maryland field. Mr. Brophy was one of the leaders in the formation of the Maryland Coal Aid Association, and was its president at the time of his death.

Monongahela Institute Elects

A. R. Matthews, general superintendent, Consolidation Coal Co., Fairmont, W. Va., was elected president of the Monongahela Valley Coal Mining Institute at the annual meeting held in Morgantown, W. Va., Dec. 19. Vice-presidents were chosen as follows: P. S. Davis, superintendent, Continental Coal Co., Cassville; Rex Longridge, superintendent, Bethlehem Mines Corporation, Bretz; Frank Campbell, superintendent, River Seam Coal Co., Booth; A. B. Spencer, division mine inspector, Morgantown; and N. A. Elmslie, division superintendent, Bethlehem Mines Corporation, Barrackville. E. D. Gall, superintendent, Arkwright Coal Co., Randall, W. Va., was re-elected secretary-treasurer.

Harlan Institute Elects

J. A. Dickinson, superintendent, Mahan-Ellison Coal Corporation, Williamsburg, Ky., was elected president of the Harlan Mining Institute at the annual meeting held in December. Other officers were chosen as follows: vice-presidents, Ray Campbell, foreman, Black Mountain Corporation, Kenvir; F. J. Sharpe, foreman, King Harlan Co., Kildav; and Steve Arnott, superintendent, Utilities Coal Corporation, Wallins Creek; secretary, James F. Bryson, director of safety, Harlan County Coal Operators' Association.

Anti-Injunction Bill Up Again

Senator Norris, Nebraska, has reintroduced his anti-injunction bill (S.935) and will press for its passage at the present session of Congress. In commenting on the bill, Senator Norris stated that it is essentially the same as that finally reported to the Senate at the last session.

The Late Thomas T. Brewster

T. T. Brewster Dies

Thomas T. Brewster, 64, president of the Mt. Olive & Staunton Coal Co., died at his home near St. Louis, Mo., Dec. 14, of heart disease. Mr. Brewster was born in Maine, and about 1900 went to Missouri to take charge of the interests of the late James Duncan, including the coal company and the Litchfield & Madison Ry. Co., of which he was assistant secretary and treasurer. During the World War, he was a member of the Federal Fuel Administration, and at various times served as president of the American Mining Congress, president of the Fifth and Ninth District Coal Operators' Association, and vice-president, American Institute of Mining and Metallurgical Engineers. He was a director of the National Coal Association for a number of years.

To Sell Stoker

Pittsburg & Midway Coal Mining Co., Pittsburg, Kan., has taken over the Southwestern agency for the "Firite" stoker, and will distribute this equipment through southeastern Nebraska, southwestern Iowa, Kansas, Oklahoma, eastern Missouri, and northeastern Kansas. The stoker is manufactured by the Hoffman Combustion Engineering Co., Detroit, Mich.

Gas Ignition Kills Three Men

Three men were killed and two others were seriously injured when an arc from a mining machine ignited gas at the face of the thirteenth entry in Overton No. 1 mine of the Alabama Fuel & Iron Co., Dec. 28. Investigation revealed that there was no explosion, the victims succumbing to the flame of the burning gas. No physical damage to the mine resulted. The accident is reported to be the first attributable to gas that has occurred in Alabama mines in the last eighteen months.

Coal-Mine Fatality Rate Declines in November; Anthracite Rate at New Low

NINETY-SIX men were killed in coal mines in the United States during November, 1931, according to reports received by the U. S. Bureau of Mines from state mine inspectors. This number compares with 134 deaths in the preceding month and 227 in November a year ago. Production of coal in November was 34,251,000 tons, a decrease of 8,000,000 tons from October and 9,534,000 tons from November, 1930. The death rate per million tons of coal mined in November, 1931, was 2.80, a decrease of 12 per cent from the preceding month and 46 per cent from November, 1930.

November reports for bituminous mines alone showed that 84 deaths occurred in the production of 30,110,000 tons of coal. Based on these figures, the death rate per million tons was 2.79, a reduction of 46 per cent from November, 1930, when there were 199 deaths and 38,609,000 tons of coal mined. In October, 1931, the death rate was 2.63, based on 94 deaths and 35,700,000 tons of coal mined.

Anthracite mines in Pennsylvania reported 12 fatal accidents and an output of 4,141,000 tons of coal in November. This resulted in a death rate of 2.90 per million tons, the lowest fatality rate for any month's operation in the history of anthracite mining. In October, 1931, there were 40 deaths, with 6,551,000 tons mined, and a fatality rate of 6.11, while in November, 1930, there were 28 deaths in mining 5,176,000 tons, resulting in a rate of 5.41.

Reports for the period January to November, 1931, showed that accidents at coal mines in the United States caused the loss of 1,319 lives. The production of coal during this period was 402,710,000 tons, resulting in a death rate of 3.28, as compared with 3.85 for the same period in 1930, when there were 1,888 deaths in mining 490,639,000 tons. Separated into bituminous and anthracite, the 11-month fatality rates for 1931 were 2.78 and 6.42, based on 967 deaths and 347,850,000 tons, and 352 deaths and 54,860,000 tons, respectively. In the same period in 1930 there were 1,478 deaths in producing 427,304,000 tons of bituminous coal resulting in a fatality rate of 3.46; 410 deaths occurred in mining 63,335,000 tons of anthracite, making the fatality rate 6.47.

There was one major disaster—that is, a disaster in which five or more lives were lost—during November, 1931. This was an explosion in a mine at Holden, W. Va., Nov. 3, which caused five deaths. During November, 1930, there were two major disasters resulting in 94 deaths. Five major disasters occurred from January to November, 1931, resulting in 51 deaths. During the same period in 1930 there were 11 major disasters, which killed 220 men. Based exclusively on these disasters, the death rates per million tons were 0.127 in 1931 and 0.448 in 1930. The major disasters in 1931 occurred at the rate of 1.24 separate disasters (as distinguished from the number of deaths resulting from the disasters) for each hundred million tons of coal produced, as compared with 2.24 for the corresponding period in 1930.

Comparing the accident record for the 11 months of 1931 with that for the same months in 1930, a reduction is noted for falls of roof and coal, gas or dust explosions, and explosives, with no significant change in the rates for haulage and electricity. The comparative rates for the two periods are as follows:

Cause	1930 Fatalities	1930 Rate	Jan.-Nov., 1930 Fatalities	Jan.-Nov., 1930 Rate	Jan.-Nov., 1931 Fatalities	Jan.-Nov., 1931 Rate
All causes	2,014	3.793	1,888	3.848	1,319	3.275
Falls of roof and coal	1,067	2.009	997	2.032	760	1.887
Haulage	303	.571	279	.569	222	.551
Gas or dust explosions:						
Local explosions	61	.115	61	.124	30	.074
Major explosions	214	.403	209	.426	51	.127
Explosives	78	.147	70	.142	34	.085
Electricity	76	.143	72	.147	57	.141
Miscellaneous	215	.405	200	.408	165	.410

Coal-Mine Fatalities During November, 1931, by Causes and States

(Compiled by Bureau of Mines and published by *Coal Age*)

State	Underground												Shaft					Surface							Total by States	
	Falls of roof (coal, rock, etc.)	Falls of face or pillar coal	Mine cars and locomotives	Explosions of gas or coal dust	Explosives	Suffocation from mine gases	Electricity	Animals	Mining machines	Mine fires (burned, suffocated, etc.)	Other causes	Total	Falling down shafts or slopes	Objects falling down shafts or slopes	Cage, skip, or bucket	Other causes	Total	Mine cars and mine locomotives	Electricity	Machinery	Boiler explosions or bursting steam pipes	Railway cars and locomotives	Other causes	Total	1931	1930
Alabama	....	....	....	....	....	....	1	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	2
Alaska	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Arkansas	1	....	....	1	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	0
Colorado	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	5
Illinois	5	....	....	....	....	....	....	....	....	....	....	5	....	....	....	....	....	....	....	....	....	....	1	1	6	9
Indiana	3	....	1	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	....	....	4	4
Iowa	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	3
Kansas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	2
Kentucky	5	....	3	....	....	....	1	....	....	....	....	9	....	....	....	....	....	....	....	....	....	....	....	....	9	13
Maryland	2	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	0
Michigan	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Missouri	....	....	....	....	....	....	1	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	0
Montana	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
New Mexico	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	3
North Dakota	1	....	1	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	0
Ohio	4	....	....	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	....	....	4	86
Oklahoma	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	15
Pennsylvania (bituminous)	12	4	5	....	....	....	....	....	....	....	1	22	....	....	....	....	....	1	....	....	....	1	....	2	24	18
South Dakota	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Tennessee	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	3
Texas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Utah	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	3
Virginia	1	....	....	....	1	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	....	3	1
Washington	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
West Virginia	5	2	2	8	....	....	1	....	2	....	....	20	....	....	....	....	....	1	1	....	....	....	....	2	22	29
Wyoming	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	3
Total (bituminous)	43	6	13	9	1	....	4	....	2	....	1	79	....	....	....	....	....	2	1	....	....	1	1	5	84	199
Pennsylvania (anthracite)	6	3	....	....	....	....	....	....	....	....	2	11	....	....	....	....	....	1	....	....	....	....	....	1	12	28
Total, November, 1931	49	9	13	9	1	....	4	....	2	....	3	90	....	....	....	....	....	3	1	....	....	1	1	6	96	....
Total, November, 1930	67	17	20	98	5	....	5	....	2	....	3	217	....	....	....	2	2	2	1	1	1	1	2	8	....	227

WHAT'S NEW

IN COAL-MINING EQUIPMENT

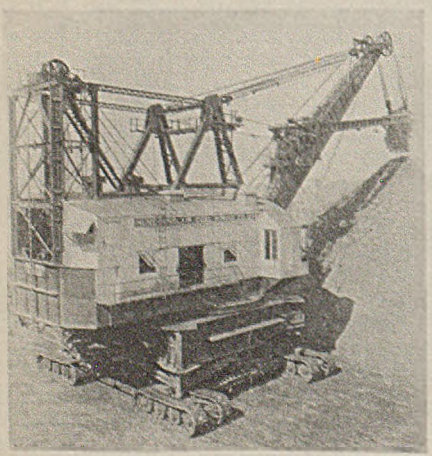
Blowers Developed

For use in tunnel construction and mine development work, the Coppus Engineering Corporation, Worcester, Mass., has developed the "Ventair" TM8 mine blower. This ventilator is of the centrifugal type and is driven by a 15-hp. motor. The company states that its greatest application is in connection with 16- and 24-in. pipe for lines from 2,000 to 4,000 ft. long. The Coppus company also has added the "Ventair" T6 and T8 blowers to its line of compressed-air-driven blowers. In addition, the "Vano" Type ST blower, driven by compressed air, has been developed for 20- to 24-in. pipe lines, where the quantity of air to be handled is too large for a centrifugal blower.

Balanced Hoist Offered For Strip Shovels

Bucyrus-Erie Co., South Milwaukee, Wis., offers the new balanced hoist for stripping shovels. Essential parts are a movable counterweight and the necessary guides and tackle. The equipment is so arranged that as the dipper goes up the bank in digging, the counterweight travels downward in its guides, thus counterbalancing practically all the weight of the shovel and increasing the available digging force. Additional advantages outlined by the company are: faster dipper acceleration in digging and returning to the pit; more accurate handling of the dipper, particularly when loading into cars; less heating of the hoist motors and generators; and reduction of peak loads. The counterbalanced hoist, it is asserted, allows the use of a larger dipper without any increase in the size of electrical equipment, and, excluding weight of the larger dipper and contents, without any appreciable increase in the weight of the machine.

Bucyrus-Erie Balanced Hoist; Counterweight Guides Can Be Seen on the Rear of the Shovel



Low-Type Mine-Car Compressors

Worthington Pump & Machinery Corporation, Harrison, N. J., has developed a new, horizontal, mine-car compressor with an over-all height above the rail of 31 in. (32 in. when fitted with a permissible motor for use in gaseous mines). These compressors are built with displacements ranging from 110 to 200 cu.ft. of air per minute, and, it declared, can operate from one to three rock drills, depending upon the size. Front and rear bumpers are rounded to permit the car, when coupled, to negotiate curves without difficulty. The 110-cu.ft. machine, fitted with a single double-acting "feather-valve" compressor, weighs 6,250 lb., and has an over-all length of 115 in. Dustproof Timken bearings are used. The air receiver has a capacity of 5½ cu.ft., and the unloading mechanism is controlled by a Worthington "trigger valve." A 20-hp., 230-550-volt d.c. or 220-440-550-volt a.c., 60 or 25-cycle motor drives the compressor through a Worthington "Multi-V-Drive." Mine-car wheels are 10 in. in diameter, and the gage is adjustable between 36 and 42 in.

Worthington Low-Type Mine-Car Compressor

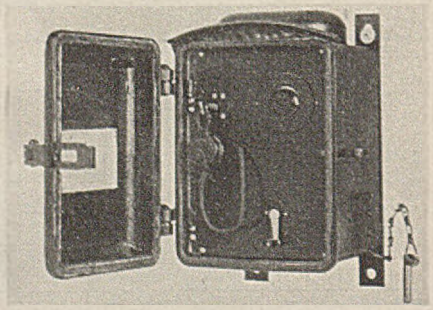
New Rock Drills

Sullivan Machinery Co., Chicago, has developed new medium-weight "Rotators" for outdoor rock excavation and downhole drilling in mines, quarries, and on construction work. "L-6" drills weigh 64 lb., and are capable of drilling from 12 to 25 ft. in depth, utilizing 1-in. steel. The machine is equipped with the new cam-type front head, in which a cam and locking bar are employed for retaining the steel in the chuck. This device is simple, rugged, and easy to lock or release, the company says. "L-6" drills are available in hollow-piston, air-tube, and water-tube types for various conditions of service.

The Sullivan company also announces the new, light-weight, Class "L-1" rock drill, which weighs 30 lb. and is 17 in. long. It may be equipped with either tee or single grip handle, as required by conditions, the single or center grip being preferred, it is stated, for underground work where the drill is held up by the operator for horizontal or upward holes. The "L-1" drill, which uses ⅞-in. standard steel, is adaptable for drilling rock and coal in strip pits, and for other underground and surface applications. Drilling depth is said to be 6 to 8 ft. in ordinary service.

Outdoor Telephone

A new outdoor telephone for railroads, mines, oil companies, lumber companies, and similar industries that require a weatherproof telephone, has been placed on the market by the Kellogg Switchboard & Supply Co., Chicago.



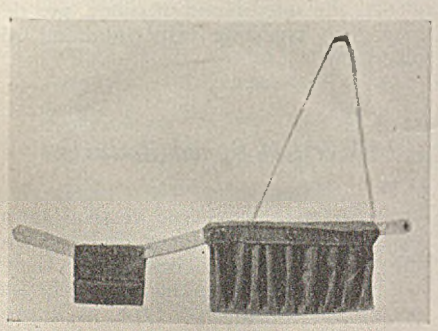
Kellogg Outdoor Telephone

Construction details outlined by the company are: the weatherproof cast-iron housing is ventilated to prevent condensation of moisture or "sweating"; all parts subject to damage by moisture are treated to withstand outdoor conditions; iron and steel parts are protected by special moisture-proof finishes; all wires are rubber insulated, and coils are specially treated to resist moisture; a cast-in shelf is provided upon which three dry batteries may be placed; ample space is provided for either the standard Kellogg five-bar or six-bar generators, which are mounted on a sliding Bakelite shelf where they can

easily be removed for inspection; the induction coil is mounted on another sliding Bakelite shelf upon which space also is available for a condenser when specified; the connecting rack is mounted on the induction coil; simplified wiring with rubber insulated wire is used throughout; the door of the iron housing is securely fastened by a locking pin which is attached to the box by a chain and the door swings to the left, permitting free use of the right hand for the operation of the generator crank and other functions; there is ample space for all equipment; all parts are easily accessible, yet the set is reasonable in size and weight; the entire telephone may be easily handled and installed by one man. In addition, it is stated, provision has been made to permit any circuit arrangement for most efficient transmission, reception, and ringing on long, heavily-loaded lines.

Rubber Explosives Containers

A rubberized explosives container and a rubberized powder can container, both designed for the use of the individual miner in transporting shooting materials

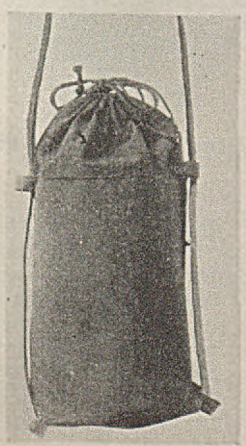


Halverson Rubberized Explosives Container

into the mine, have been developed by Frank A. Halverson, Glen Richey, Pa. The explosives container is made of rubberized fabric, and has two compartments. The larger compartment is designed to hold enough pellet powder or dynamite for a day's work. Each stick is enclosed in a separate compartment to eliminate friction. The smaller compartment, which is so fastened to the belt that it is on the opposite side of the wearer from the explosives compartment, is for carrying caps. A loop is provided for suspending the container from the wearer's shoulder.

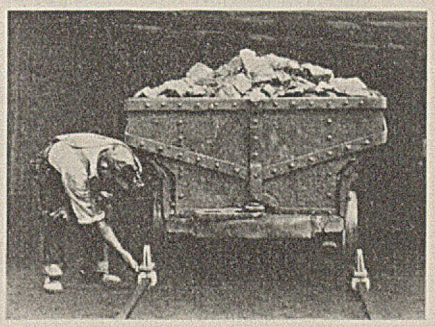
The powder can container, made of a rubberized fabric, holds one of the usual powder jacks and, according to the maker, eliminates danger from sparks. Both carriers are waterproof.

Rubberized Powder Can Container



Mine-Car Safety Blocks

Mine Safety Appliances Co., Pittsburgh, Pa., offers the M-S-A mine-car safety block, which consists of three malleable iron castings. Two of the castings are riveted together at the top, and make up a set of jaws which grip the ball of the rail. The third casting is



M-S-A Mine-Car Safety Blocks in Use

a clamp which slips down over the jaws to lock them to the rail. The jaws slip over the rail quite easily, the company says, and can be securely set in a few minutes. Two sizes are available, for 20- and 25-, and 30- and 40-lb. rail, respectively.

Electric Portable Hoist

Ingersoll-Rand Co., New York City, has added to its line of portable hoists a non-reversible, single-drum electric hoist designed for many applications in the mining, contracting, and industrial fields. It is modeled after the company's "Utility" hoists, except that it uses an electric motor and friction clutch instead of an air motor and a jaw clutch.

The new hoist is suitable for all single cable work within its capacity, such as hoisting timbers, muck, tools, and pipe, hauling and spotting cars, and for single-line scraping. It is made in two sizes. No. 107 is of 7½ hp. and is rated at 2,000 lb. pull at 125 ft. per min. It has drum capacity of 400 ft. of ½-in. or 700 ft. of ⅜-in. cable. No. 107L is of like power, but has drum capacity of 800 ft. of ½-in. or 1,400 ft. of ⅜-in. cable. No. 110 has a 10-hp. motor and is rated at 2,000 lb. pull at 165 ft. per min. The drum capacity is the same as that of No. 107. No. 110L has the same power as No. 110 and the same drum capacity as the No. 107L.

These new hoists, the company says, are simple, rugged, and compact, are easily operated, have smooth control, and graduation of speed. They have a self-energizing brake for stopping and holding the load and an automatic safety drum lock for added safety when handling suspended loads. Moving parts are protected by dust-proof construction. Bases are drilled and grooved for either column mounting or bolting to a flat surface. Either a.c. or d.c. motors can be furnished.

Ingersoll-Rand Co. has added two new sizes to its line of electric double-drum hoists for slushing service. They are the No. 207, 7½ hp., and No. 210, 10 hp. These machines are constructed essentially the same as the 15-hp. and 20-hp. sizes which have been made for some time. When equipped with standard a.c. 220-440-volt, 3-phase, 60-cycle, or d.c. 230-250-volt motors, No. 207 will give 2,000 lb. rope pull at 125 ft. per min., and No. 210 will give the same rope pull at 165 ft. per min. The cable capacity of both drums is 475 ft. of ⅜-in. or 275 ft. of ½-in. for both hoist sizes. These new hoists are designed, it is stated, for slushing service in metal and coal mines, and for general scraping and dragline operations in industrial fields.

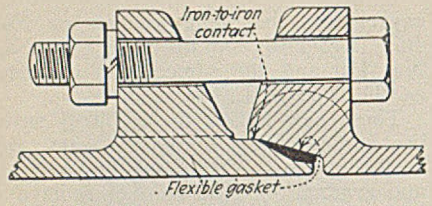
Worm Gear Reduction Unit

A recent addition to the series of standard worm gear reduction units manufactured by the Cleveland Worm & Gear Co., Cleveland, Ohio, is designed, the company says, to transmit up to about 7½ hp., the capacity depending on the reduction ratio and worm speed. The new size of unit is furnished in both horizontal and vertical types, and is designated Size 70. The horizontal units are built with the worm below or above the gear, designated type AT or RT, respectively. In the type VT vertical unit, the gear shaft extends upward, the gear shaft of the type VD extending downward.

Housing of the Size 70 unit is said to be exceptionally sturdy, with heavy walls, internal ribs, and bolt flanges. Oil seals are fitted on each shaft extension. Standard keys are furnished with each reducer. In a range of nine standard ratios varying from 4⅝:1 to 60:1, the Size 70 unit can be shipped immediately from stock. A list of fifteen special ratios also is available.

Joint for Cast-Iron Pipe

Central Foundry Co., New York City, has developed the Universal Dual-Lok joint for use with cast-iron pipe manufactured by the company. Pipe is cast in 6-ft. lengths, and the hub and spigot are machined to make the joint.



Dual-Lok Joint Installed

In installing the pipe, a rubber gasket, dipped in castor oil or other suitable lubricant, is slipped over the spigot end, and the joint drawn together by bolts, which pass through lugs cast on the end of the pipe. Double assurance that the joints will remain tight results from the use of the iron-to-iron contact between the machined surfaces and the added rubber gasket. The Dual-Lok joint, the company states, allows for settlement of pipe; provides holding ability in excess of that required by usage; requires less labor to install; and is thus more economical. Only wrenches are required to join the lengths, and different types of gaskets are available for different services.

Drum Reverse Switch

Allen-Bradley Co., Milwaukee, Wis., offers a new splash-proof drum reverse switch (Bulletin 350WP) for use with either alternating or direct current in places where much moisture is present or where an open-type switch is not desired. Motor currents can be handled directly by the switch at the following ratings: alternating-current, 3 hp. at 110 volts, 5 hp. at 220 volts, and 7½ hp. at 440-550 volts; direct current, 1 hp. at 115-230 volts. The switch is provided with six fingers and may be wired for use with limit switches. Easy access to all parts for inspection and adjustment is emphasized by the manufacturer.

Electrical Equipment Offered

A new, plunger-type, snap-action, weatherproof limit switch (CR-9441-LS443D) for general industrial applications in hard service is offered by the General Electric Co., Schenectady, N. Y. The switch, it is asserted, is particularly adapted to foot operation, and may be mounted in any position. Six electrical circuits are provided, three normally open and three normally closed. Each contact arm can be removed by taking out one screw to gain access to the terminal studs for connecting the control lines. The switch has a positive snap action in either direction, it is asserted. The plunger is fitted with two main springs; the returning spring resets the switch in normal position when pressure is removed from the plunger, while the overtravel spring compensates for any overtravel in excess of ½ in. required to operate the switch. Facilities are supplied for adjusting the overtravel in installing the switch.

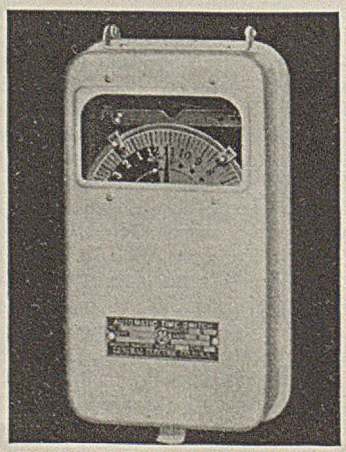
The General Electric Co. offers a new mercury flush tumble switch similar to the standard flush tumble switch except that the circuit is made and broken by a mercury tube. A composition box with slightly more than the ordinary depth is provided. Extremely long life and silent operation are claimed for the switch, which is of the single-pole type.

A line of horizontal electric air heaters for industrial applications is offered by the General Electric Co. Ratings are: 1,000 watts at 115 volts; and 1,000, 2,000, 3,000, and 4,500 watts at 230 volts. The heaters consist of a number of General Electric strip heaters mounted in black-japanned and perforated pressed-steel cases. Each is equipped with 3 ft. of armored cable and a three-heat snap switch mounted on a standard conduit box. The heaters are designed for wall or floor mounting.

Actual operating time of any electric equipment using alternating current is shown by a time meter introduced by the General Electric Co. Within the meter is a synchronous motor which operates while the circuit to the equipment is closed. This motor drives a five-digit cyclometer counter, arranged to read either in hours or minutes. The meter is supplied on a pedestal for portable use or with a threaded connection for mounting on conduit. Types available operate on 110, 220, or 440 volts; 25, 50, or 60 cycles. No one meter, however, has more than one voltage or frequency rating.

The T-13 time switch is offered by the General Electric Co. for turning lights on or off at any predetermined time, starting or stopping motors when desired, or controlling heat in buildings. In lighting control, the time switch will allow for geographical latitude, the season of the year, and holidays, the company states. Selective operation also is possible, so that the switch will turn off or on part of the lights or equipment, and leave the rest in operation. All duties, the company says, cannot be performed by one type, but various designs are available for different tasks. The equipment is designed for a.c. circuits carrying 30 amp. at 115 volts or 15 amp. at 230 volts. Single- and double-pole models for single- or double-throw operation are available with either plain or astronomical dials. Apartment-house lighting is handled by a two-circuit model. Except in the astronomical and two-circuit types, riders may be installed to give practically any number of operations per day, the company asserts.

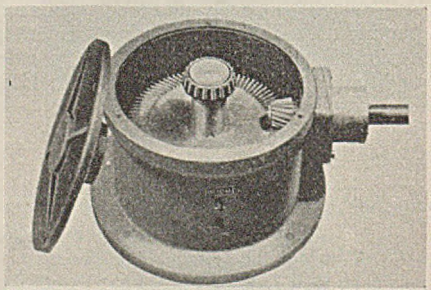
T-13 Time Switch



Several changes in its Type CD, strip-chart recording instruments have been announced by the General Electric Co. The chart reroll is now separate and spring-driven to relieve the time clock of the added duty. Indicating scales are removable and interchangeable, and the chart speed of the portable types can easily be changed from inches per hour to inches per minute, it is asserted. An automatic locking device prevents the reroll spring from running down when the used paper roll is removed, and an automatic brake balances the pull of the reroll, preventing the application of enough force to pull the paper off the driving sprockets or to overrun the clock. Additional improvements, the manufacturer states, are designed to facilitate inspection and replacement.

Vertical Speed Reducer

D. O. James Mfg. Co., Chicago, has brought out a new type vertical spiral bevel-gear speed reducer, said to feature smooth, noiseless operation. Gears are made of chrome-nickel steel, and are of the spiral bevel type, as it provides more teeth in constant contact and greater tooth bearing in each tooth of a given size, the company says. High efficiency is thus provided, it is claimed, and the delivery of input



D. O. James Vertical Spiral Bevel Gear Speed Reducer

power is greater. Shafts are made of 40 carbon steel, and roller bearings are provided for both drive and driven shafts. Where large ratios of reduction are required, the reducer may be made integrally with a planetary reduction gear so that all ratios from 8 to 1 to 1,600 to 1 are available. The reducers are made in sizes of from ¼ to 100 hp.