COAL AGE

A McGraw-Hill Publication — Established 1911

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

New York, August, 1929

Volume 34....Number 8

Sales-Minded

AVERAGE REALIZATION on bituminous coal during the first six months of the current calendar year were the lowest reported in any similar period since 1916. *Coal Age* Index of spot bituminous prices for the half-year was only 145—equivalent to a weighted average price of $1.75 per net ton f.o.b. mines on major production east of the Mississippi River.

PART of the steady downward trend which has characterized the course of prices since car shortage and strike scares lost their hypodermic potency has been due to cost-cutting achievements in production. But, unfortunately, these achievements are not the whole explanation. Too much of the decline may be charged to brutish competition which has sacrificed both today's profits and tomorrow's values.

MORE AND MORE because of this insane selling, leaders in the industry are studying merchandising and analyzing sales methods with an intensity of application which before the World War was reserved for production problems. More and more top executives are becoming sales-minded. They are asking themselves what legerdemain can transform individual sales at less than the cost of production into a net profit on the whole series of transactions.

THE DEEPER this study is carried and the larger the number of companies that engage in it the sooner will be the realization of that stabilization which is the goal of leadership in the industry.

SUCH A STUDY is no belittlement of the production side of coal. On the contrary, it is the surest and the quickest way to encourage further engineering development and to reward engineering skill. Such a study will go far in breaking down real or artificial barriers which now separate too many production departments from their sales organizations. It will show where production processes may and ought to be improved and will suggest how these improvements can be capitalized in sound merchandising.

PRODUCTION PROBLEMS and sales problems cannot safely be divided; they are phases of common problems and must be so considered if financial success is to come. Therefore, the industry from trapper boy to president can well afford to become sales-minded; indeed, the industry cannot well afford to remain otherwise.

IN NO OTHER WAY can management and men, capital and labor, possibly be adequately compensated and genuine, permanent stabilization be won.

Courtesy Kennedy & Co., N. Y.

Coal Mine, Longford

From an Etching by
Joseph Pennell

Should Our Coal Mines *Be Fully* Mechanized?

What the Records Show . . .

By Eugene McAuliffe
President, Union Pacific Coal Co.

THERE is a great deal said and written today regarding what we are pleased to term "mechanization" of coal mines. The term as we now make use of it is a misnomer for the reason that all mines of any consequence are now, at least partially, mechanized. Steam and electric hoists, motor-driven pumps, air compressors, air and electric-driven coal-cutting machines and electric haulage locomotives are familiar manifestations of the employment of mechanical devices in and about the coal mines as a substitute for the hand labor and animal power formerly used.

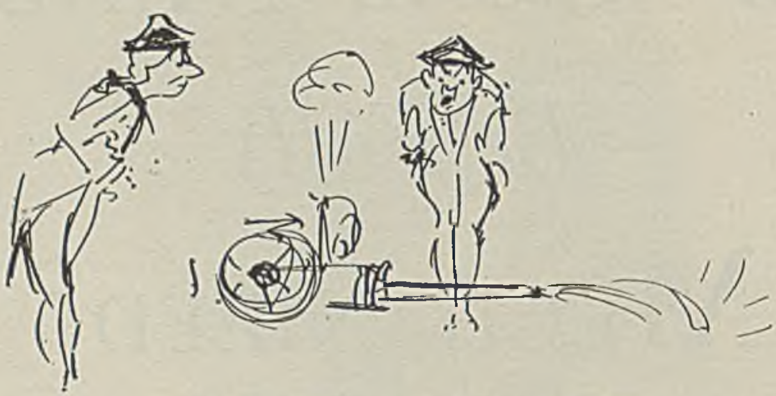
The coal mining industry is now nearly seven centuries old. Henry III of England granted a charter to the town of Newcastle-upon-Tyne, to "dig coal," in 1239. By the year 1281 the Newcastle trade had reached such proportions that laws were passed for its regulation. Steam entered the picture in the year 1705, and ten years later the first steam pumping engine was installed in a colliery in the Newcastle field. So it may be said that the mechanization of coal mines had its beginning in 1715.

Two hundred and fourteen years have passed since that epoch-making day and we are still plodding along with the mechanizing process. With every passing year a volume of coal equal to 156 times that of the great pyramid of Cheops is shoveled from the mine floor into pit cars for transport toward daylight. To relieve 500,000 men of the work of lifting sixty or seventy billion shovelfuls of coal a height of from 2 to 5 ft. is the *summa summarum* of what is now in our minds when we speak of mine mechanization.

When the ultimate in mine mechanization will be reached, however, is hard to determine. Generally speaking, power-driven ventilating fans,

In 1239 King Henry of England Granted a Charter to Dig Coal

Coal-mine mechanization really began as far back as 1715—and yet, with over two centuries behind us, the industry is still only plodding along the road to complete achievement. Why?



Steam Pump Ushered In Mechanization in 1715

steam and electric hoists and electric coal-cutting machines are now so common as to pass without comment. If, however, the progress toward mechanical loading parallels the growth of machine-mined coal, the end of hand shoveling is yet afar off. The first record of coal tonnage undercut by machines was made in 1891, when 5.2 per cent of all bituminous coal was so mined. In 1927, 36 years later, 72.2 per cent was undercut mechanically, but only a small percentage of anthracite is being undercut by machines.

Without a desire to be critical it can be said that the coal industry has substituted machinery for man power only when the demand for coal, or certain physical conditions, made the substitution absolutely necessary. There is yet little evidence within the industry of the desire to lead, to excel, that is graven on each milestone that marks the progress made by other industries, such as transportation, steel making and electric-power production.

From the very beginning rail transportation has been the blood-brother of the coal industry. Whatever differences may arise between them, they must continue to live with each other. The first railway to transport "goods" was a carrier of coal, built by the owners of a colliery who sought to expand their market by moving coal in quantity to tidewater. So came the Stockton & Darlington into existence, a mere tramway in the beginning, over which trains of "coal waggons" were pulled by horses.

The managers of this little railway, 37 miles in length, heard of the steam locomotive, and, after four or five tiny experimental toys had been tried only to fail, George Stephenson, on the afternoon of Sept. 27, 1825, standing on the foot plate of his little machine, named "Locomotion," opened the steam valve, starting the first train of "coal waggons" ever moved by steam power. On the rear of the train of coal cars was coupled an old stage-coach body taken off its usual supports, the coach body with its load of directors mounted upon a framework, which in turn rode on a set of "coal-waggon" wheels.

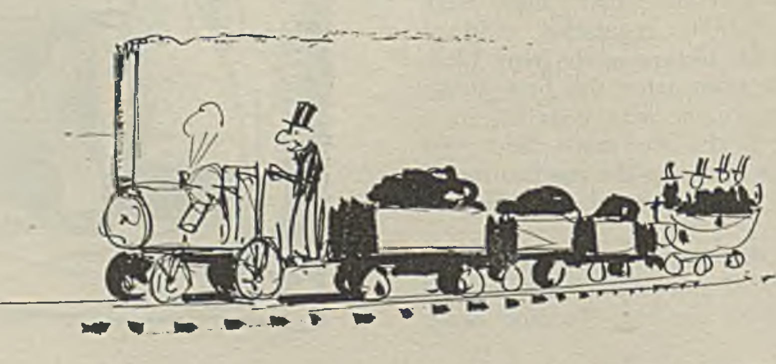
Why Progress Is Slow

The men who owned the Stockton & Darlington did not undertake steam locomotion as an experiment; instead, they investigated, made up their minds to make steam transportation a success—and succeeded. They might have asked Stephenson, engineer, inventor, pioneer, to send them a locomotive on trial, but instead their initial order was for three locomotives. Like the boys who played marbles fifty years ago, they "played for keeps."

The paths of the coal and the railway industries have run parallel since that autumn day in England, 104 years ago, but the two industries have not kept abreast of each other; the railroads have outstripped coal. The steam locomotive of today little resembles the child of Stephenson's brain and hands; instead it has assumed proportions undreamed of even but a generation back. It has been enlarged and refined through inventive genius until its capacity, efficiency and dependability fit it to be classed among the modern wonders of the world. We are given to wonder where our civilization would now rest if our steam railways had kept as close to the traditional as has the coal industry.

Man, whatever altruistic theories he may profess, invariably seeks material reward in return for labor and money invested, and so it is but natural to ask if the further mechanization of coal mines will pay. There has been much generalization in the discussion of results past obtained. A few among those who are the

Stephenson Takes the "Coal Waggon" for Its First Ride Behind Steam in 1825



strongest proponents of the mechanical loading of coal within the mines either lack actual experience with coal-loading machines or such partial attempts as they have undertaken failed of continuation or expansion. Many who are actually getting results are decidedly reticent in expressing the exact measure of the success they claim, in terms of reduced man power and net saving per ton of coal mined.

The Machine Substitutes the Joy of the Gang For Sour Isolation

Lest this article follow that most marked characteristic of the coal industry, a hesitancy about giving out anything that might be used for "fact-finding" purposes, we herewith present the experiences of one company that is committed to the theory of 100 per cent mechanization, in so far as such is possible.

Man Is Not Cast From a Common Mold —As Wage Studies Show

As costs and unit production vary widely as between individual mines and producing districts, due to differences in physical conditions, rates of wages paid, duration of work year, etc., the comparisons shown herewith have been reduced to relative ratios, the year 1923 taken as the base year, its ratio fixed as 100 per cent, and the five succeeding years performance related by percentage comparisons to that of the base year. Throughout the six yearly periods the wage scale was maintained on a uniform basis with the exception of the month of December, 1928, when a reduction in rates took effect. In order that uniformity of comparison be maintained, the wages for this one month were recalculated and thereafter set up on the old basis, making the wage rate uniform throughout the period shown.

The per cent of coal loaded mechanically has risen gradually, due to a desire to substitute machines for man power only as the original force decreased from natural causes—resignation, death, disability, or through necessary disciplinary measures. The ratio of mechanically loaded coal will reach 60 per cent in 1929. As the company is now finishing certain mines approaching exhaustion, the combination of these two conditions will perhaps delay complete mechanization until 1933 or 1934. In the meantime no employee of the company who could and who wished to remain has been forced out to make room for a machine.

Among the questions we are repeatedly asked might be mentioned, What type of machine does your company use? We can only answer, several; Thews, Joys, large-capacity scrapers and shaker conveyors used in connection with the "duckbill." There are many other machines doing as well as or better than are ours, but we have tried to keep the variety down. We do not hesitate to say that there is now on the market a machine that will load coal in any mine. There may likewise be a "best" machine for each certain mine or field.

Again, we are asked, What gain in efficiency is to be obtained from mechanical loading? One answer deducible from the figures quoted is that of additional tons per man-shift or per man-year. The results so obtained are wholly related to costs; the employer is the gainer.

There is, however, another result which is now shown in the tabulation:

Table I—Effect of Mechanization on Unit Costs and Production

	Year 1923	1924	1925	1926	1927	1928
Number of employees	3,034	2,770	2,486	2,241	1,915	1,838
Percent of employees (using 1923 as 100 per cent)	100.0	91.3	82.0	73.9	63.2	60.7
Total tons coal loaded	3,241,105	2,821,678	2,779,065	2,776,245	2,750,430	2,927,390
Per cent coal loaded mechanically	3.2	5.7	9.6	21.7	40.3	51.3
Original investment in loading equipment per ton annual production	$0.387	$0.330	$0.291	$0.343	$0.296	$0.286
Original investment per ton after depreciation	.217	.177	.128	.241	.197	.173
Ratio of payroll cost, per cent	100.0	92.8	87.2	83.5	75.1	72.5
Ratio of total mine cost, per cent	100.0	93.7	86.7	84.1	72.2	76.3

that of removing the man from the arduous task of shoveling at the face, giving him instead the lighter and more cheerful job of operating a machine in company with from three to ten fellow workmen, where dull monotony gives way to variety. To work hard and to brood in darkness at the face of a room is one situation, to move around among his fellows in

Will it pay? Mechanization as an ideal will have a practical appeal only if it can be shown to pay dividends to management and men. The balance sheet shows that it will

Some Men Are Worth Almost Any Wage; Others Would Prove a Liability If They Worked for Nothing

a well-lighted and well-ventilated place, with the attendant dust allayed by frequent sprinkling, represents an altogether different one.

A question that is vital to employer and employee alike is that of the effect that additional machinery has on the earnings of the men. Any study of wages earned within a certain mine will show not only a marked difference between individuals but between classes as well. In past years the idea has prevailed among the representatives of the industry charged with the work of making wage scales and of operation that, as the machine runner, his helper, and the loader were direct producers, they should be paid a liberal rate. The day workman was looked upon as a necessary evil to be kept down in the rate paid and in number employed.

This situation resulted in poorly maintained ventilation, indifferent track installation and maintenance, and poor transportation service—best known as a "poor turn." To remedy this condition the tonnage-paid man came back year after year for a higher rate—which was almost uniformly granted—until his potential earnings became so high as to lead to union-made restrictions on output, this portion of the mine labor looking upon 6 or 7 hours, with an adequate turn, as a fair day's work.

The operator has persistently fulminated against six-hour day preachments, forgetful of the fact that he has actually created, and still main-

Man Seeks Material Reward For His Labor

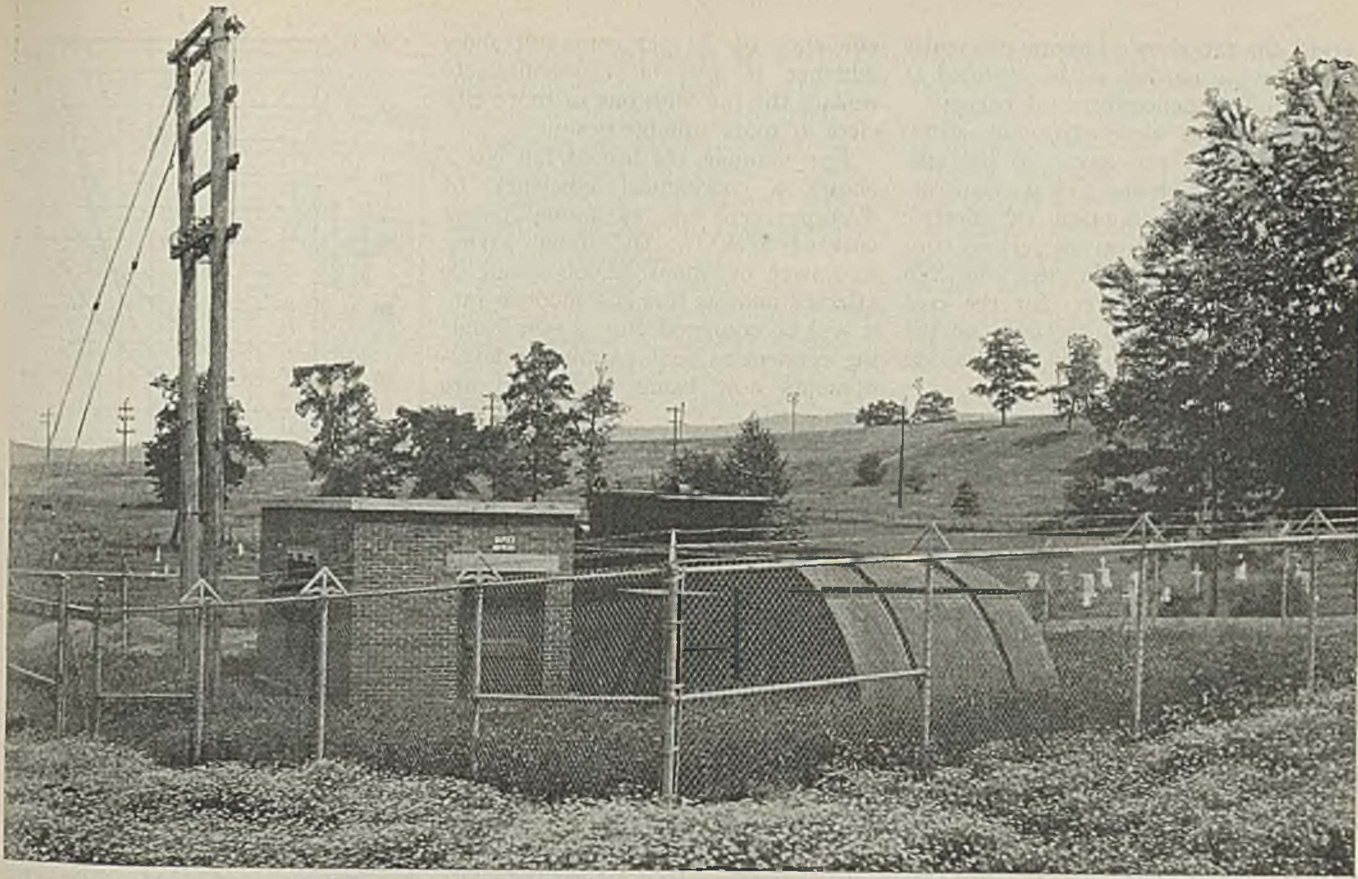
tains, a short day within his own mines. There is a vast difference between individual men. Some men are worth almost any wage while others would prove a liability if they worked for nothing.

Out of our experiences with mechanical coal-loading machinery we have developed the fact that all men so employed will work eight hours. We have done away with the artificially inflated wage earned in six hours by a portion of the men, bringing the average of all men closer together. There should and always will be a proper variation in rates of pay, but the variation should be based on productivity and skill, and not on distorted wage bases.

All men living in and about a coal mine have, their families being of equal size, quite the same living expenses. Their rents, fuel, supplies, union assessments—if unionized—life and accident insurance are likewise quite uniform. Why let one poor devil work for 40 or even less per cent of the earnings accorded an individual in the favored class? One of the more recent major crimes committed in the form of wage-scale making was that of asking one class of "inside-the-mine" workman to labor for $3.97 per shift less than the man who may actually live next door to him. Whatever the motive behind this abnormality was, the effect could only be that of further postponing the day when mine labor would learn to respect cheerfully and co-operate with the management in the industry for their common welfare.

Before closing we wish to mention the one outstanding advantage that will accrue to the coal industry from complete mechanization. We believe in the process as representing the one definite method by which the excess mines and man power can be eliminated. Mechanical loading properly effected will reduce mine costs and it will thereby establish a system of selectivity which will enable the mechanically equipped mine to survive. The other mines will then be compelled to go the way of the ammunition and other war-material factories that sprang into existence during the World War.

"Too many mines and too many miners!" The complaint is an old one. Complete mechanization will selectively eliminate the uneconomic mine and release the surplus workers for profitable employment in other industries



Is it time *To Change Your Fans?*

By C. H. Matthews
Electrical Engineer
Susquehanna Collieries Co.,
Wilkes-Barre, Pa.

In the anthracite region every mine must have several fans if the workings are to be satisfactorily ventilated. This provision is made necessary by the methods used in operating the mines and by the fact that many seams of coal are being worked. Moreover, the conditions for ventilation are by no means static but vary from year to year. As a mine develops, its workings become more extensive, its seam thicknesses change and faults introduce irregularities that often modify the demands on the fan.

It is, therefore, essential that the water gage be read frequently and that measurement be made of the volume of air being delivered so as to get some indication of the degree of efficiency with which each fan is operating. Only in this way can it be ascertained whether conditions as to fan or airway must be changed in order to deliver air to the face with maximum efficiency. In an effort to get a minimum power bill, new equipment, of course, could be purchased or money could be spent for the relocation of the various ventilating units without effecting savings of such magnitude as would eventually repay the principal. Such efforts to reduce energy costs would be entirely unjustified. There are, however, many instances where a new, or a relocated, fan is necessary. The volume of air delivered by a fan often decreases and when it does it is not the fault of the fan but of the mine. When that happens the airways must be enlarged or shortened so as to lower the resistance and thus to decrease the water gage necessary for the delivery of the required quantity of air or else the fan speed must be increased so that the higher water gage it creates may overcome the increased resistance to the flow of air.

It frequently happens that the fan cannot be speeded to meet the changed conditions, in which case a new fan may be necessary, but sometimes the unit can be provided with a new rotating element that will afford the characteristics desired. Though the delivery of the required quantity of air to the mine working always is the paramount consideration, the fan should operate efficiently so that the needed air is provided at a minimum expenditure of energy.

When fans were driven by steam little thought was given to the efficiency at which the fan was operating. On the adoption of electric drive, efficiency received serious consideration, especially when the fan used purchased power, for the cost of energy depended not only on the kilowatt-hours consumed but also on the kilowatt demand.

A complete test of volume, water gage, speed and power input should be made once a year to ascertain with what efficiency each fan is operating. The accompanying table shows the results of tests on twelve mine fans and it will be noted that the mechanical efficiency varies from 18.8 to 72 per cent. Several of these fans formerly were steam-driven and have been converted to electric drive.

Old fans which are well fitted to the mine which they have to ventilate and are therefore operating with the maximum efficiency of which they are capable will sometimes show a better performance than fans of more recent and better design which, unfortunately, are located at airways which demand fan characteristics different from those which the fan possesses. Because a fan operates well on one aircourse is no reason for assuming that it will operate equally well at another location, for two aircourses are seldom alike. If a fan is delivering the required quantity of air to the particular workings to which it is connected the only question as to its suitability is the quantity of power being consumed.

The power input to an electrically driven fan can be easily measured, and when the motor characteristics are known the horsepower input at the fan can be determined thus:

$$\text{Air horsepower} = \text{Volume} \times \text{Water gage} \div 6345$$

$$\text{Mechanical eff'y} = \frac{\text{Air horsepower}}{\text{Horsepower output of motor}}$$

or

$$\frac{\text{Air horsepower}}{\text{Mechanical eff'y}} = \text{Horsepower output of motor}$$

Having the kilowatt input at the motor, the line losses can be assumed at 10 per cent and the kilowatt input at the substation or busbars of the power plant can be found.

At most mines a fan operates 24 hours per day and 365 days per year at the same speed, so the annual power consumption is easily determined with sufficient accuracy for practical purposes. Thus the power cost for any fan can be determined. Comparing the actual mechanical efficiency with a possible mechanical efficiency of 70 per cent will show whether it will be economical to replace the fan with one of more efficient or more suitable design.

For example, the test of fan No. 2 shows a mechanical efficiency of 49.4 per cent and an annual power cost of $7,400. An annual saving in power of about $2,000 could be effected and, as this is a modern fan, it will be equipped with a new rotating element as soon as mining developments now being considered are completed.

Fan No. 11 is an example of an efficient design of fan working on an airway to which it is not suited. An air supply of 35,000 cu.ft. is now required, or about double the present volume. The volume of air delivered by a fan varies directly with the speed. Therefore:

$$35{,}000 \times 183 \div 16{,}600 = 386 \text{ r.p.m.}$$

The water gage varies as the square of the volumes or speeds; hence

$$35{,}000^2 \times 0.6 \div 16{,}600^2 = 2.66 \text{ in.}$$
$$\text{or } 386^2 \times 0.6 \div 183^2 = 2.66 \text{ in.}$$

Curve No. 1 shows the characteristics of fan No. 11. It demonstrates that with a water gage of 0.6 in. the fan will deliver 38,000 cu.ft. per minute, but, unfortunately, the mine will pass only 16,600 cu.ft., or less than one-half. It indicates also that at 2.66 in. water gage the fan will deliver 80,000 cu.ft., but the calculations show that the airway will pass only 35,000 cu.ft. per minute. A new fan has been purchased to replace this present No. 11 fan. This is designed to give 35,000 cu.ft. of air at 2.66 in. water gage. It will afford the following volumes of air for given water gages, running speeds and motor horsepower:

Volume Cu.Ft.	Water Gage	Speed R.P.M.	Horsepower Motor
35,000	2.7	500	25
40,000	3.5	571	35
45,000	4.5	643	50

The speed of this fan permits direct connection of motors at 514, 600 and 720 r.p.m. synchronous speeds.

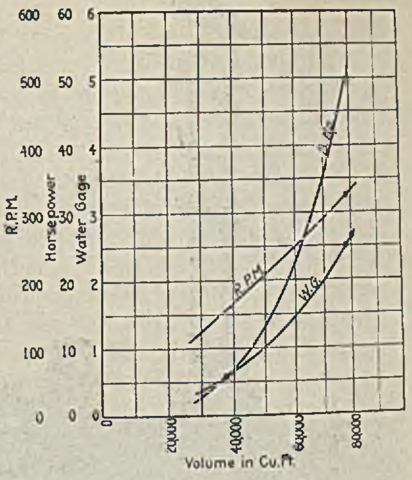


Fig. 1—Chart of a Fan That Had Low Efficiency at One Mine but Will Give Splendid Service at Another

Consequently fan No. 11 is free for some other service better suited to its characteristics and it is to be used in place of fan No. 12, which is now delivering 50,000 cu.ft. at a location where 72,000 cu.ft. of air per minute is desired. The water gage required on the airway where fan No. 12 has been working is 1.2 in. The water gage necessary to raise the quantity of air from 50,000 cu.ft. per minute to 72,000 cu.ft. per minute will be

$$72{,}000^2 \times 1.2 = 50{,}000^2 \text{ or } 2.49 \text{ in.}$$

Fig. 1 shows that this fan must rotate at 325 r.p.m. for 2.49-in. water gage and should deliver 77,500 cu.ft. of air at that speed. The airway cannot pass more than 72,000 cu.ft. at that water gage, but a little margin is desirable and it is so small that the fan may be expected to operate efficiently.

By purchasing a new fan to replace No. 11 and by using No. 11 fan to replace No. 12, the proper volume of air will be delivered to both workings and efficiency will replace waste.

Tests of Twelve Fans

Fan No.	Size, Feet	Volume, Cu.Ft.	Water Gage, Inches	R.P.M.	Air Horse-power	Output Horse-power	Mechanical Efficiency Per Cent	Input Kilo-watts	Annual Input Kilo-watt Hours	Annual Power Cost
1	20 x 7	64,000	2.3	90	23.2	46.5	50.0	43.0	376,000	$4,130
2	8.5 x 5	116,500	1.9	171	35.0	71.0	49.4	77.0	673,000	7,400
3	16 x 5	57,000	2.4	116	21.6	34.3	63.0	37.0	324,000	3,565
4	8.5 x 5	134,000	2.0	170	42.3	67.5	62.7	73.0	638,000	7,025
5	8 x 4	124,000	1.0	171	19.6	46.5	42.2	43.0	376,000	4,130
6	10 x 5	110,000	1.5	176	26.1	61.5	42.4	66.0	577,000	6,350
7	18 x 7	61,000	1.4	88	13.5	51.2	26.4	56.0	490,000	5,400
8	7 x 3	62,200	1.5	175	14.7	20.4	72.0	22.0	192,500	2,120
9	10 x 5	119,000	2.2	145	41.4	67.0	62.0	62.0	542,000	5,950
10	8 x 5	83,200	1.6	172	21.0	48.0	43.7	52.0	455,000	5,000
11	5 x 3	16,600	0.6	183	1.58	8.4	18.8	9.0	78,700	865
12	9 x 4	50,000	1.2	183	9.47	22.0	43.0	24.0	210,000	1,910

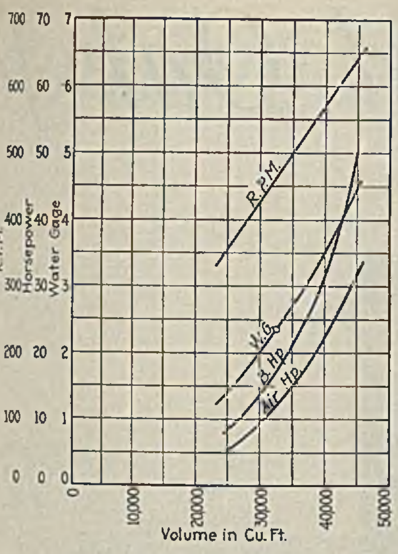


Fig. 2—Chart of a Fan Which Will Give Good Service at the Mine to Which the Other Fan Was Unsuited

Fan No. 4 is being installed on a new aircourse which will permit the abandonment of fan No. 6. Fan No. 4 is now operating in a fairly efficient manner, but how it will work in connection with the new aircourse is an unknown factor, as the data for its resistance at any specific volume of air cannot yet be ascertained. As soon as this fan is installed on its new airway, complete test will be made. It is likely that then it will be found that a new rotating element will be necessary.

Other fans in the accompanying list probably will be replaced, though in some cases the airways will be modified to meet future conditions more satisfactorily.

The possible savings in power must be compared with the investment required to make the changes in each ventilating fan, as any estimate of power savings must take into consideration all the carrying charges of the expenditure.

As stated above, changes in mining operations modify the performance of a fan and the savings in power effected by the installation of more efficient ventilating equipment must make such an adequate return on the capital invested as to wipe out the investment in a few years, unless the fan can be transferred to another mine. When, however, a fan becomes unable to supply the air required by the workings of a mine an investment in new ventilating equipment is inevitable. Then the question of power saving does not enter. The air is needed and the new fan must be bought, the cost being provided not from power savings but from the sale of the coal.

Government Experts Condemn Dependent Shooting in Mines

SHARP protest against the use of dependent shooting in coal mines is voiced in a recent information circular (No. 6147) of the U. S. Bureau of Mines on "Hazards in the Use of Delay-Action Detonators," by D. Harrington, chief engineer of the safety division, and S. P. Howell, explosives engineer at the Pittsburgh station. The authors say:

"The attention of the Bureau in a number of instances has been called to the firing of shots of permissible explosives in coal mines with delay-action detonators. In one bituminous mine they were used to bring down the coal for conveyor loading; in another in blasting pillars which were not undercut; in another in one of the two charges separated by stemming in deep drillholes where the coal was cut and sheared and mechanically loaded; in another in shooting top coal; and in another in the shooting of coal faces electrically from the surface. Some of these mines were rated as gassy by the state mining department in the state concerned. In most instances the charging of holes was done while the working shift was in the mine, and in some the shots were blasted while the working shift was in the mine.

"In all of these cases the shots were dependent—that is, the efficacy of the succeeding shots was dependent—upon the firing of the preceding shot or shots. The first shot, or possibly two or three shots, was usually fired with a no-delay electric detonator, or an instantaneous electric detonator.

"The hazards attending the firing of such shots are obvious when one considers that the first shot or shots may release inflammable gas, will usually produce and put into suspension more or less fine coal dust, and unquestionably on occasion will so bring down the coal that there is an inadequate burden on succeeding holes. In some cases this burden may be but a few inches, or the shot may be entirely exposed. When the succeeding shots go off, the flame of the explosive will be likely to ignite the gas or the coal dust and thereby produce a local gas or dust explosion which may or may not be followed by a widespread dust explosion, depending upon the surrounding conditions. Should a first or second delay shot fail to detonate, the burden for succeeding shots may be so excessive that these shots will blow out, this also produces conditions which may result in ignition of gas or dust, or of both, even when permissible explosives are used.

"AS a matter of fact, permissible explosives used in delay-detonator shooting lose their permissibility, since there is a possibility, even a probability, that in some of of the shots the explosive may be detonated essentially in the open. Under such circumstances there may be ignition of gas or dust, or of both, and, moreover, the first shots may cause later ones to misfire or even be mixed into the coal pile in an undetonated condition, later on to constitute a hazard to workers or to consumers of coal.

"Perhaps it should be stated that delay-action electric detonators are very desirable blasting accessories to use in mines other than coal mines—in quarries and in general blasting where there is no gas or dust hazard. In fact, their use is increasing for these purposes. However, careful coal-mining people have long recognized the numerous dangers of dependent shots in any kind of coal-mine blasting. Some states absolutly prohibit the use of dependent shots in coal mines, and all states should prohibit their use. There is absolutely no question that blasting with delay-action detonators is dependent shooting.

"There is no coal-mining blasting problem which cannot be met successfully by the use of permissible explosives properly confined in drillholes and fired by instantaneous electric detonators; certainly delay-action electric detonators should not be used in any coal mine when any person is in the mine during the blasting period. If an operating company for any reason insists upon using delay-action detonators in any kind of blasting in a coal mine, the blasting should be done when all persons, including the shotfirers, are out of the mine."

Steel, Concrete and Oak for

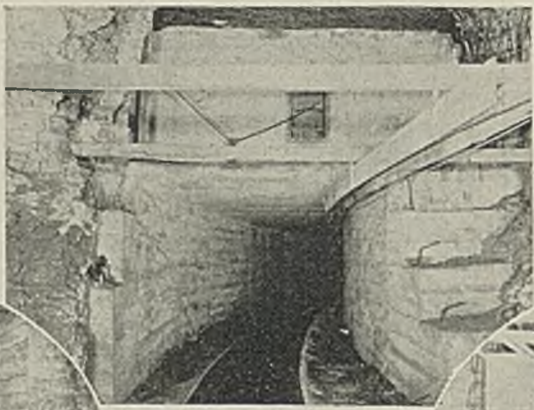


Fig. 1—Overcast Under Bad Roof

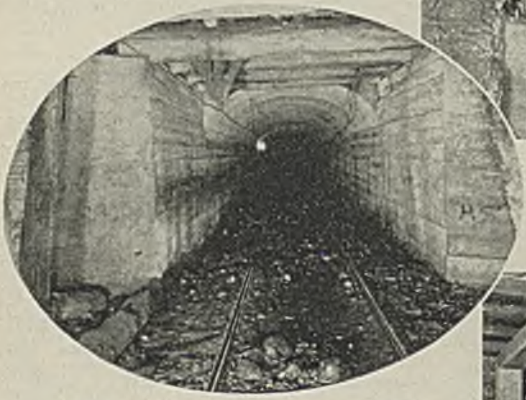


Fig. 2—Road Arched With Concrete—A Costly Experiment

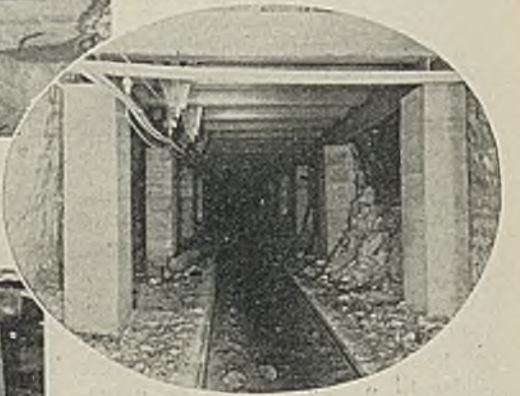


Fig. 3—Substitute for the Arch

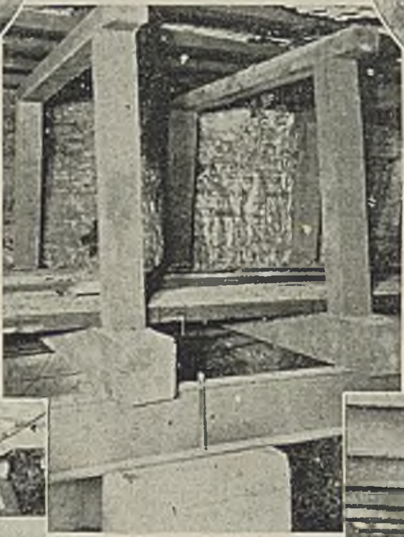


Fig. 4—Where the Roof Is High

Fig. 5—Holding Roof at a Junction

Fig. 6—Where East Meets West

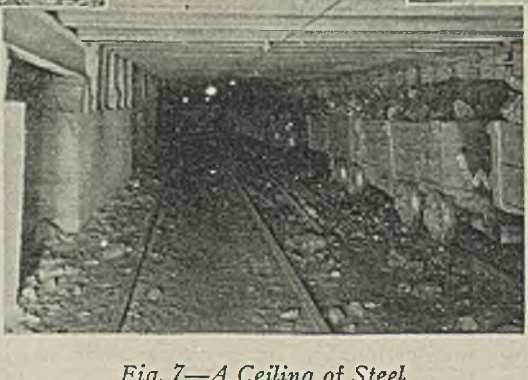


Fig. 7—A Ceiling of Steel

Holding Mine Roof

A BELL & ZOLLER ... POLICY ...

WITH timbering as with maintenance and general construction, the Bell & Zoller Coal & Mining Co., operating in Franklin County, Illinois, follows a definite policy which decrees that jobs be done at an early stage of necessity, when they are likely to cost least. More than that, the jobs are to be completed with that degree of permanence which the calculated period of usefulness warrants, in order that little or no maintenance will be required subsequently. That this is the policy is made evident by the great permanence of the roof supports on the main haulways in the Bell & Zoller mines, where concrete, steel and oak are used liberally.

In Fig. 1 is shown a track turnout, with concrete walls and roof on which rest an overcast. This turnout is of 100-ft. radius and when started was expected to remain in the coal, but a roll, which made it necessary to take up as much as 15 ft. of bottom, was encountered after the turnout had been driven only a few feet. After the grading had been started it was noted that the bottom rock was shattered and that consequently the ribs were working and the roof was weakening. To remedy the condition it was decided that supporting-and-retaining walls should be erected as the road was graded.

The overcast was necessary because the turnout, which is on a return, crossed two intake airways. The walls are about 140 ft. long and have a minimum thickness of about 12 in. and a height of 8 ft. The roof is a reinforced-concrete slab 8 in. thick.

In a 100-ft. stretch of bad roof on a primary haulway (see Fig. 2) concrete walls were poured and on them was constructed a concrete arch. Though this type of construction proved satisfactory, it was found to be too costly and the company has turned to the practice where the roof is weak of erecting concrete piers on either side of the road, laying thereon steel beams as stringers to parallel the roadway on either side. Where the roof is of normal height or nearly so, oak crossbars are set between the stringers; where the roof is higher, additional height is imparted to the support by the erection of square sets over the oak crossbeams, which thus serve as sills. The management discourages the use of cribbing where it can be avoided, especially in combination with construction methods of a more or less permanent character.

Besides giving the job a more workmanlike appearance, the square sets are less confined than cribbing and allow fresh air to circulate through them. Where cribbing is employed, the air surrounding it tends to stagnate and to gather carbon dioxide, thus stimulating the growth of fungi. True, carbon dioxide, being heavier than air, should seek the lower level of the main air current, but as the temperature of the carbon dioxide at the upper level is likely to be higher than that of the fresh air at the lower level, removal of carbon dioxide is not complete. Furthermore, cribbing provides more skin-to-skin contacts. It is in the crevices where two timbers join, as well as in the crevices in the timber itself, of course, that the spore, which later develops into the fungus, is first sown.

Examples of the more desirable construction are illustrated in Figs. 3 and 4. It was utilized in a 140-ft. stretch of main haulway, where about 8 ft. of bottom was taken in the grading of a hill. Here were erected eight pairs of concrete piers, each 15x36 in., on which were placed 15-in. I-beams as stringers. On the latter at intervals of 5 ft. were placed 12x12-in. square-sawn oak timbers which serve as sills for square sets of 6x8-in. section. Track ties were used for lagging over the square sets and a floor was laid over the sills of the sets, the discarded floor boards of mine cars being used for that purpose.

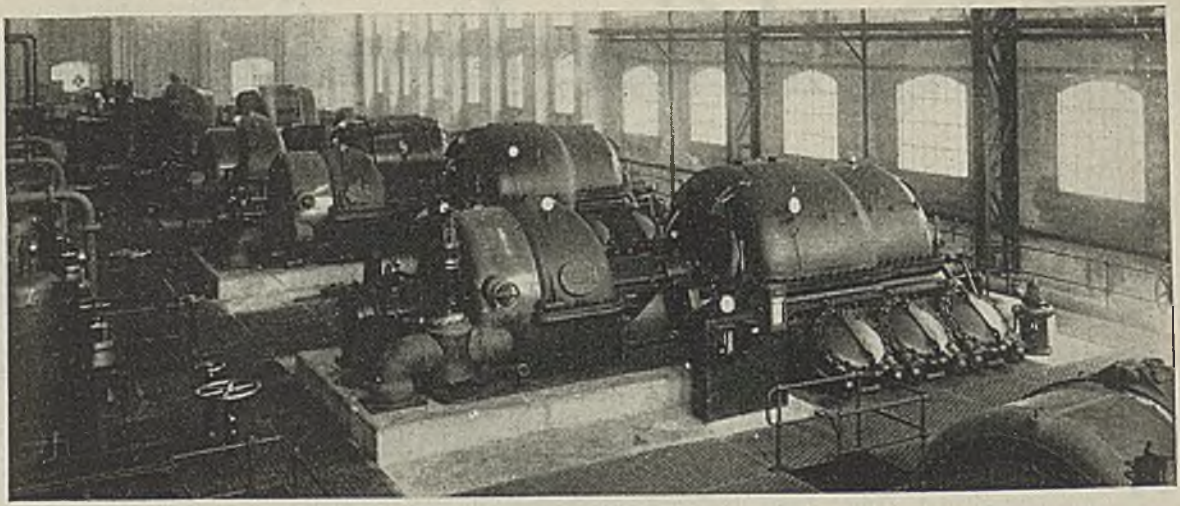
Where wide spans are created by the construction of track junction points, generous but not extravagant use is made of steel for the support of the roof. In Fig. 5 appears a 200-ft. radius switch from a main haulway to the shaft bottom. Here the roof is supported by heavy concrete piers and by 15-in. I-beams disposed as stringers with crossbeams on 4-ft. centers. Two stringers are placed on each row of piers. The largest beam is 28 ft. long. In Fig. 6, which shows the junction of the main haulage from the east and the west sides of the mine and, incidentally, the dispatcher's office, the roof span is 36 ft. Here again generous use is made of steel for permanent construction.

The chief and practically only item of maintenance of the underground roof-support structures is the cost of painting the steel. The beams are brushed and painted when they show signs of needing protective treatment. A good grade of bridge paint is used for the purpose. This company has found by experience that, under conditions in its mines, paint can be used effectively to combat rust.

Mine Lighting

From the standpoint of lighting there are illuminating engineers ready to classify coal mines as the worst working places in the world. Natural conditions, the hazards of temporary wiring, battery-weight limitations on cap lamps, vibration and shock all introduce problems to challenge the skill of the lighting specialist. But studies being made to improve mine lighting have developed much interesting data on the subject. Some of the fruits of this research will be examined by Samuel G. Hibben, head of the illumination department of the Westinghouse Lamp Co., in an article in an early issue of COAL AGE.

One of the most interesting phases of the study is an analysis of lighting costs vs. man power and efficiency. Mr. Hibben finds that, under certain conditions, it costs $10 to $15 annually to provide reasonably good lighting for each worker. Expressed in wages, this lighting cost, says the author, represents 23 seconds out of one hour of operation; therefore, if better lighting can save more than 23 seconds per hour it will pay for itself in increased output.



Turbo-Compressors and Generators, Bargoed Power House

AIR *Is Transmitted As Cheaply as Electricity* AT WELSH COLLIERY

By J. H. Pierce

Member, Stuart James & Cooke, Inc., Consulting Engineers New York City

AFTER the Armistice was signed in 1918 many new mines were projected in Great Britain. Among these was the Ogilvie Colliery of the Powell-Duffryn Steam Coal Co., located at Deri, Glamorganshire, South Wales. The mine was originally laid out to work the coal in the Red Vein and Rhas Las seam, underlying 1,000 acres of surface. This coal would have given the mine a life of 25 years. Later this acreage was increased to 1,600 and thus the mine has enough to suffice for 40 years.

Two circular shafts each 21 ft. in diameter and lined with concrete were sunk to tap the Rhas Las seam at 1,404 ft. and the Red Vein at 1,638 ft. The Red Vein is 3 ft. thick and the Rhas Las 4 ft. 3 in. and both dip approximately 1 ft. in 14.4 ft. to the south. The coal is a steam product and is used essentially for railroad locomotives.

Over two thousand tons daily is hoisted up the downcast shaft in two 8-hour shifts. Prior to 1927 Welsh mines hoisted only during a single shift due to the opposition of the labor unions to two shifts, but with the depression prevalent in Wales this opposition was removed, and the mine was double-shifted. It is interesting here to note that this has resulted in lower operating costs, because with it the face advanced further per day, thus reducing the area of the active workings. At the same time overhead costs were appreciably lowered.

I regard this as one of the best collieries I have ever seen, for the engineers made a surface layout that was exactly suited to the topography, and in addition so laid out the surface buildings as to conserve space and eliminate all useless movement of men and material. The coal is mined by longwall, but inasmuch as the coal works very freely, due to numerous slips running at an angle of 45 deg. from floor to roof, it is unnecessary to undercut it by machines. The coal is not shot down by explosives, but when necessary the coal is freed by Siskol air picks. As the mine is quite gaseous, compressed air is used for drills, for conveyors and for the secondary-haulage rope system.

The Powell-Duffryn Steam Coal Co. uses compressed air in a manner which calls for comment. Operating officials in America are opposed to compressed air as a power medium because of its great cost. Furthermore, when they are compelled to use compressed air they generate it by small portable or semi-portable units in order to cut down the investment in long airlines and to avoid the frictional losses that such long lines entail.

Because Ogilvie Colliery is gassy there is practically no choice as to a power medium, so the use of compressed air is not surprising. The interesting feature, therefore, is the method of transmission.

In America a coal company owning a group of mines would have compressors at each mine, but the Powell-Duffryn company generates its air in a central station and transmits it to its various collieries. The central station is at Bargoed, and installed in it are three air compressors, each developing 40,000 cu.ft. of free air per minute at 80-lb. pressure per square inch. These compressors are of the turbine type instead of the favored horizontal reciprocating type so common in America. They probably are the largest units ever built. The claim is made that the air from a turbo-compressor contains far less water than the air from a reciprocating unit, because in the latter unit both cooling and compressing proceed together.

While these machines are equipped with automatic devices for regulating the output to suit the varying load, in actual practice they rarely come into use, because of the tremendous air reservoir that is afforded by the 18 miles of pipe. This air system is so unusual that I obtained the following information concerning it from a paper read by Edmund L. Hann before the South Wales Institute of Engineers on Nov. 30, 1923.

All the main air transmission lines are constructed of acetylene lap-welded steel pipes. The size of these mains varies from 28-in. diameter, which is the size from the power station to the junction of the Deri and Rhymney valleys, to 12 in., which is the diameter at the extreme end. So far as possible the pipes are kept off the ground, being placed on brick pillars to permit painting.

In order to determine how large the pipes should be, curves were drawn for each section of the line. The first curve showed the interest, depreciation and maintenance costs of various diameters of pipes. The second curve was drawn on a similar base and showed the energy losses in the pipes per year under the anticipated system of loading. The ordinates of these curves were then added together and gave a curve which had a definite minimum which represented the diameter of the pipe main yielding the lowest yearly charge.

Some of the factors which were responsible for the adoption of a central compressed-air station as against the production of compressed air at the individual collieries probably would be of interest. It was estimated that the quantity of compressed air required in order to meet the demands resulting from the large extension of machine mining would be 100,000 cu.ft. per minute, and this represented an increase of 45,000 cu.ft. per minute over the capacity of the machines then installed at the various collieries. In the first place, a test was made on some typical steam-driven air compressors, which could be regarded as at least equal to the average equipment in use. The steam consumption per brake horsepower was found to be not less than 18 lb.

It was found by tests that the power taken by an electrically driven piston-type compressor, compressing from normal atmospheric pressure to 75 lb. per square inch gage, was approximately 133 kw. per 1,000 cu.ft. per minute of free air, measured as electrical input to the driving motor. The corresponding power taken by the large turbo-compressors at Bargoed, compressing to the same pressure and measured at the compressor coupling, is 123 kw. per 1,000 cu.ft. of free air per minute.

For comparative purposes the steam consumptions required to produce this power under various conditions would be as in Table I.

Table I—Consumption of Steam With Various Types of Compressors

Type of Compressor	Steam Conditions Pressure, Lb. per Sq.In.	Total Temp., Deg. F.	Steam per Brake Horsepower	Steam Consumption, Lb.
Existing steam-driven compressors as tested	150	500	18.0	3,000
Electrically driven compressor	300	700	7.9	1,410
Steam turbo-compressors	300	700	7.9	1,300
Uniflow compressor	200	600	10.0	1,660

These figures do not include losses in transmission, which depend upon the distance of the point of consumption from the generating station, but they can be added from Table II.

It was obvious that the steam-driven air compressor which was tested with the result given at the head of the table did not represent what could be done by the best practice of the present day. Doubtless the Uniflow type of engine would have given a lower consumption than either the compressors as tested or new compressors of like type, but at the disadvantage of requiring heavy capital cost both for plant and buildings.

Even if that had been overlooked the steam consumption would not have been as good as either the electrically driven compressor or the large steam-driven turbo-compressors. The question, therefore, was reduced to the factors of the capital cost and the efficiency of transmission.

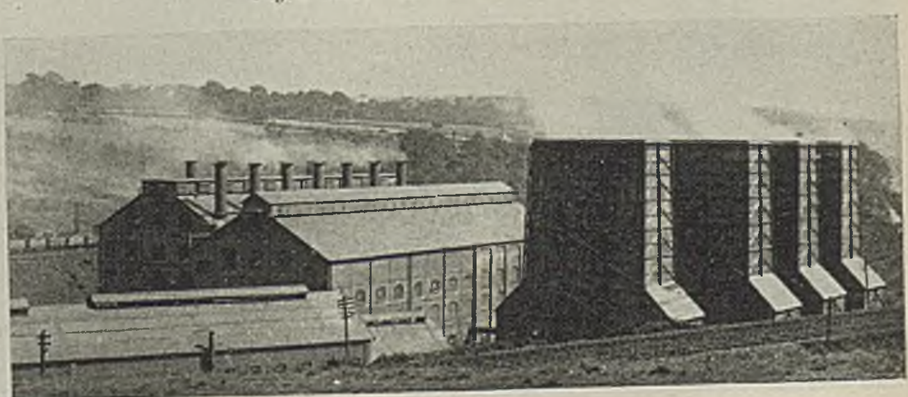
A statement is given in Table II showing the comparisons of the capital costs and efficiencies for generating and transmitting 20,000 cu.ft. of air various distances by alternative means: (1) Transmitting electric current to a point at which the compressed air would be used, and there using a motor-driven air compressor; (2) generating by steam-driven turbo-compressors and transmitting the air by pipe lines, the size of the air mains chosen being such as to give approximately equal energy losses to those experienced in electrical transmission.

In obtaining the capital charges for the electrical equipment the following costs have been included: The transmission line or a portion thereof, the necessary transformers, switchgear,

Table II—Capital Costs for Generating and Transmitting 20,000 Cu.Ft. of Air Per Minute with Approximately Equal Energy Losses of Electricity and Air

	Distances Power Is Transmitted in Miles 1	2	3	4	5
Capital Costs					
With electric transmission	$273,700	$289,300	$304,900	$320,400	$336,000
With air transmission	155,800	176,600	197,200	217,900	238,600
Losses, Per Cent					
With electric transmission	1.8	2.5	3.2	3.9	4.6
With air transmission	0.85	1.7	2.5	3.3	4.2

Fig. 1—Exterior View of Power Plant



generating plant, compressors and motors with the necessary starters and switchgear, the unit electrical compressor being assumed to have a capacity of 6,600 cu.ft. per minute and to be driven by a synchronous motor. Three of these sets would be required to produce 20,000 cu.ft. of air per minute and one would act as a standby.

The transformer capacity, includin, a standby, would need to be 4,000 kva., and the generating plant, including a proportion of spares, would require to be 4,000 kw. The generating plant included the cost of foundations and buildings, also switchgear. Boiler house and boiler-house equipment have been excluded, as the cost of these would be identical in the two systems. The compressed-air scheme includes turbo-compressors with their auxiliaries and 50-per cent spares,

The pressure drops in the air mains would be about 35 per cent greater than the energy losses given. Maintenance would be approximately equal for an airline or for an electrical line. Leakage losses are practically nil. Chances of failure are about equal and depend upon the care with which the plant is inspected and maintained.

THERE is such a wide variation in the consumption of compressed air that it was anticipated that during the afternoon and night shifts only one of the 40,000-cu.ft. compressors would need to be worked. However, should more air be needed it could be provided by electrically driven compressors at the far ends of the mains, these being already available at the several collieries which were to be served by the central plant.

The experience gained in operating this station for a period of three years at these unusually high temperatures and pressures has been attended with certain difficulties but, speaking generally, it may be said that no really serious problems have arisen from either heat or pressure, except that on some of the turbines which were constructed with cast-iron diaphragms the cast iron grew, preventing the closing of the top half of the casing on the bottom half when the machines were opened up.

This difficulty was met by turning down the diaphragms, and it now appears that this growth has ceased. No similar trouble was experienced with diaphragms of cast steel.

No description will be given of the hoisting and screening plant, for these plants throughout Great Britain are of surprisingly similar design both as to screening and arrangements for handling the cars at the shaft top. These arrangments have already been described by myself as also by others.

Reference has been made in an earlier article to the efforts being made by foreign mine operators to obtain low-cost power, and the Powell-Duffryn company is to be especially commended for the close study it has made of this subject. For what follows Mr. Hann's paper is again used as a source of information.

The Powell-Duffryn company started in 1905 to replace isolated plants at the collieries by a central station located at Middle Duffryn. This plant consisted of two 750-kw. sets generating 3,000-volt 50-cycle current. This station has gradually expanded until now the installed capacity is 52,000 kw.

Later when the use of coal-cutting machines, face conveyors and secondary mechanical haulage became general, the consumption of power grew to the point where it was imperative to build another power station.

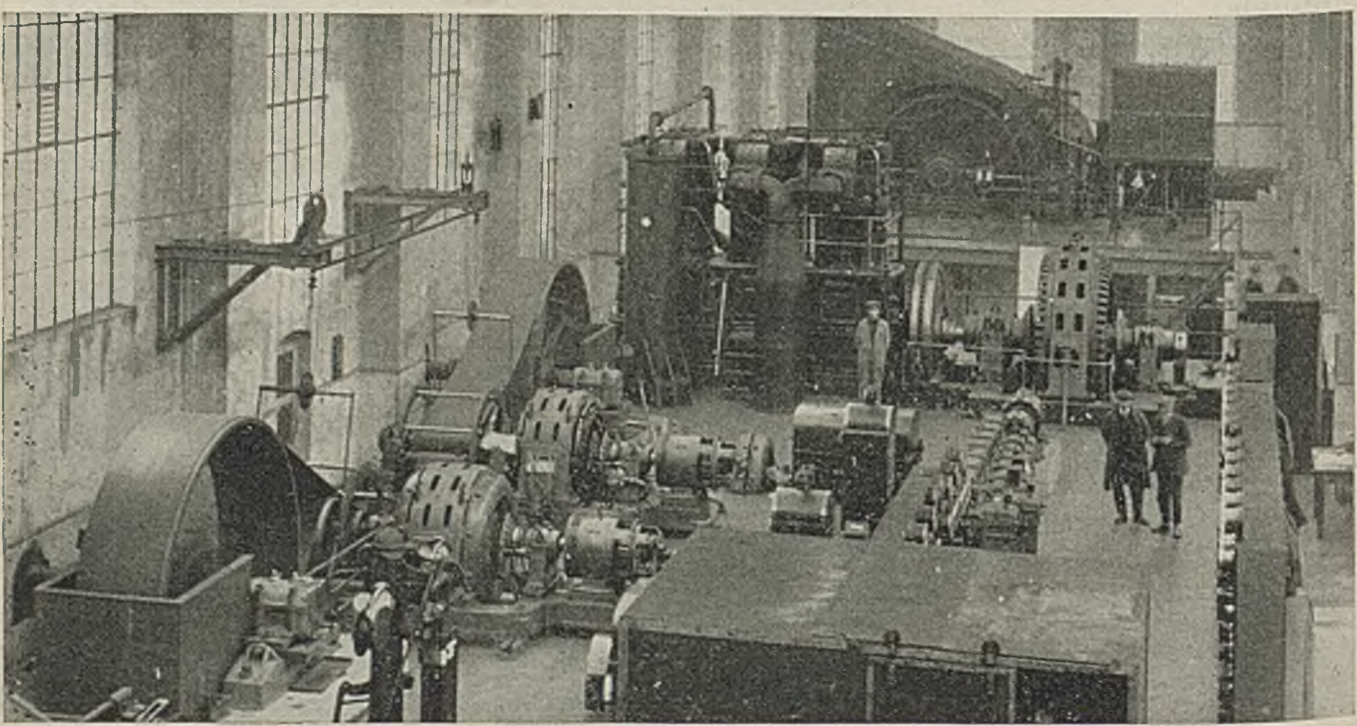
THE new plant was located at Bargoed, where alone such a satisfactory water supply was available that cooling towers were unnecessary.

No description will be given of the power plant itself. Current is generated at a potential of 11,000 volts and is transmitted at 3,300 volts, the voltage depending upon the conditions of the particular case. The large air compressors to which reference has already been made are located in the same building as the generators.

With this new plant and with a transmission system connecting all its collieries, the company is in a position to electrify any of the collieries where the change seems justified.

The writer wishes to acknowledge with gratitude the kindness of Major J. R. N. Kirkwood for the assistance rendered in obtaining the above data.

Fig. 2—Hoisting Engines and Generators at Ogilvie Colliery



Nation-wide Increase in Use of

Screening Equipment

Shows Progress in Bituminous Preparation

*By H. O. Rogers and F. G. Tryon**

Statistics Section, Coal Division, U. S. Bureau of Mines

In 1927 there were in operation in the United States 7,011 bituminous coal mines of commercial size, of which 2,886 mines, shipping 382,193,000 tons, or 79.6 per cent of the total bituminous coal shipped, were equipped with screens. Of these mines, 1,584, shipping 245,713,000 tons, were equipped with shaker screens, but this quantity includes a small tonnage shipped from mines using vibrating screens; 704 mines, shipping 72,138,000 tons, were equipped with gravity bar screens; 200 mines, shipping 27,919,000 tons, used a combination of gravity and shaker screens; and 398 mines, shipping 36,423,000 tons, including a few that were equipped with revolving screens, used screens but did not report their type.

These figures are a byproduct of a study made by the Bureau of Mines of sizes of coal shipped in 1927 (see *Coal Age*, Vol. 34, pp. 30-32). Incidental to that study, the authors had occasion to compile lists of mines using different types of screening equipment as given in "The Keystone Coal Buyers' Catalog."† The results of this compilation indicated that the subject deserved more adequate treatment, and accordingly the accompanying table and charts were prepared. In determining the quantities stated, the Keystone Catalog classification of screening equipment has been weighted by the quantities shipped as reported by the operators to the Bureau of Mines. As the Bureau has no direct information of its own on the types of screens in use in 1927, the accuracy of the result obviously depends on the accuracy of the Keystone Catalog's descriptions of individual mines. The reputation of this catalog in the trade would appear to justify its use for such a purpose.

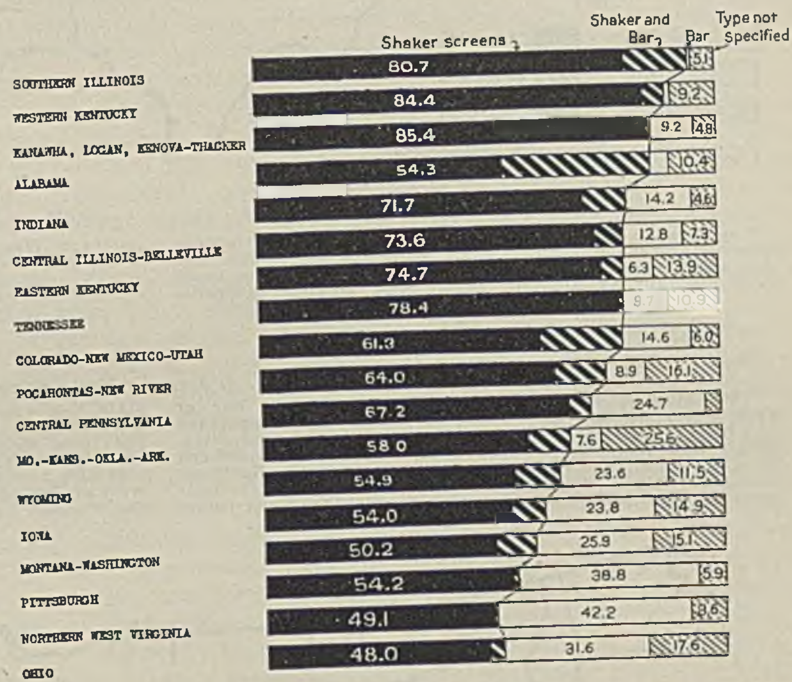


Fig. 1—Proportion of Shipments from Screen-Equipped Bituminous Mines in 1927 Coming from Mines Using Shaker Screens, Those Using Both Shaker and Bar Screens, Those Using Bar Screens Only, and Those Using Screens but Not Reporting the Type Employed

The diagram refers only to mines equipped with screens and should be read in conjunction with the first column of the table, which shows the proportion that such mines form of the total. In southern Illinois, for example, 80.7 per cent of the shipments from such mines came from mines using shaker screens, 14 per cent from mines using both shaker and bar screens, 0.2 per cent from mines using bar screens only, and 5.1 per cent from mines with screens of a type not specified. The large percentage of combined "shaker and bar" in Alabama includes a number of mines with shaker screens combined with revolving screens.

The editors of the Keystone Catalog request each operator to state whether his mine is equipped with gravity, inclined shaker, horizontal shaker, or revolving screens, but in this study it was desired only to know the number of mines that were equipped with gravity screens and the number equipped with a more improved type. The mines were therefore classified as follows:

(1) Mines using shaker screens (including the few that use vibrating screens); (2) mines using both shaker and bar screens in combination (including a small number using a combination of shaker and revolving screens); (3) mines using bar or

*Published by permission of the Director, U. S. Bureau of Mines. (Not subject to copyright.)

†Published by the McGraw-Hill Catalog & Directory Co., New York.

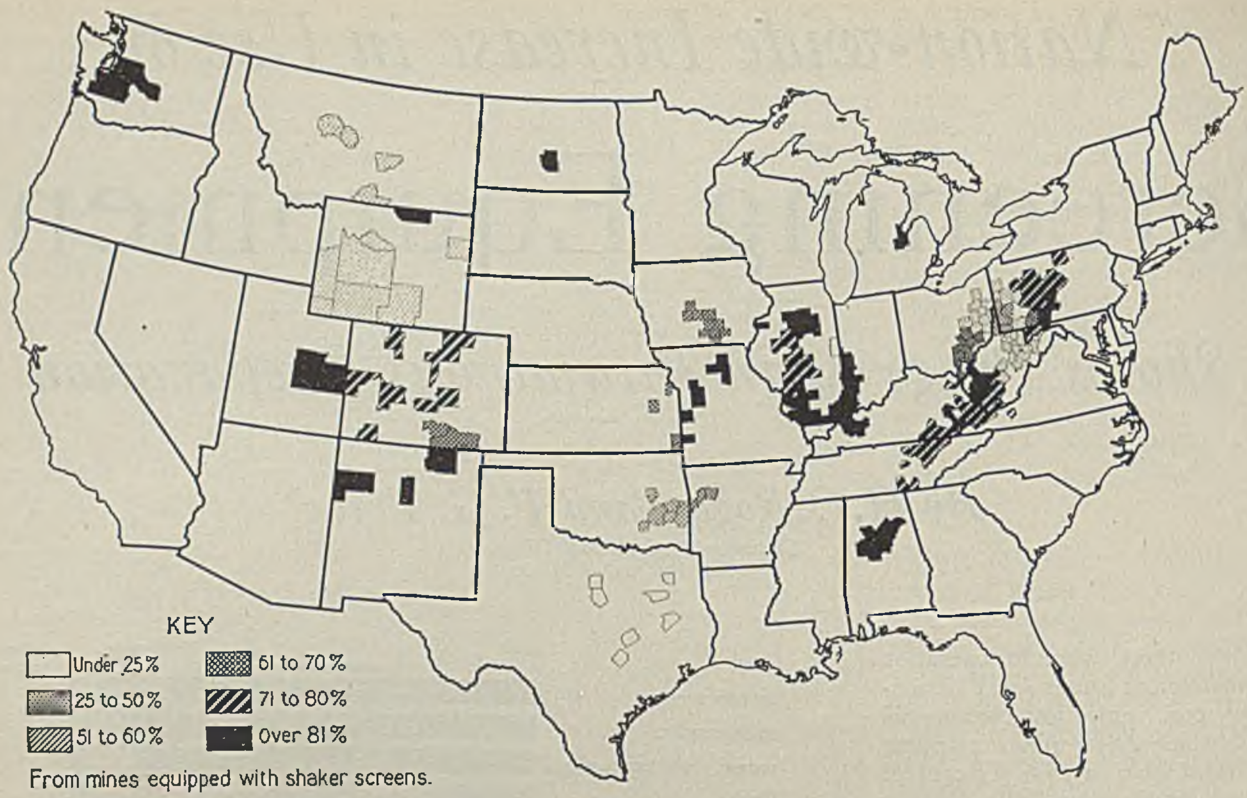
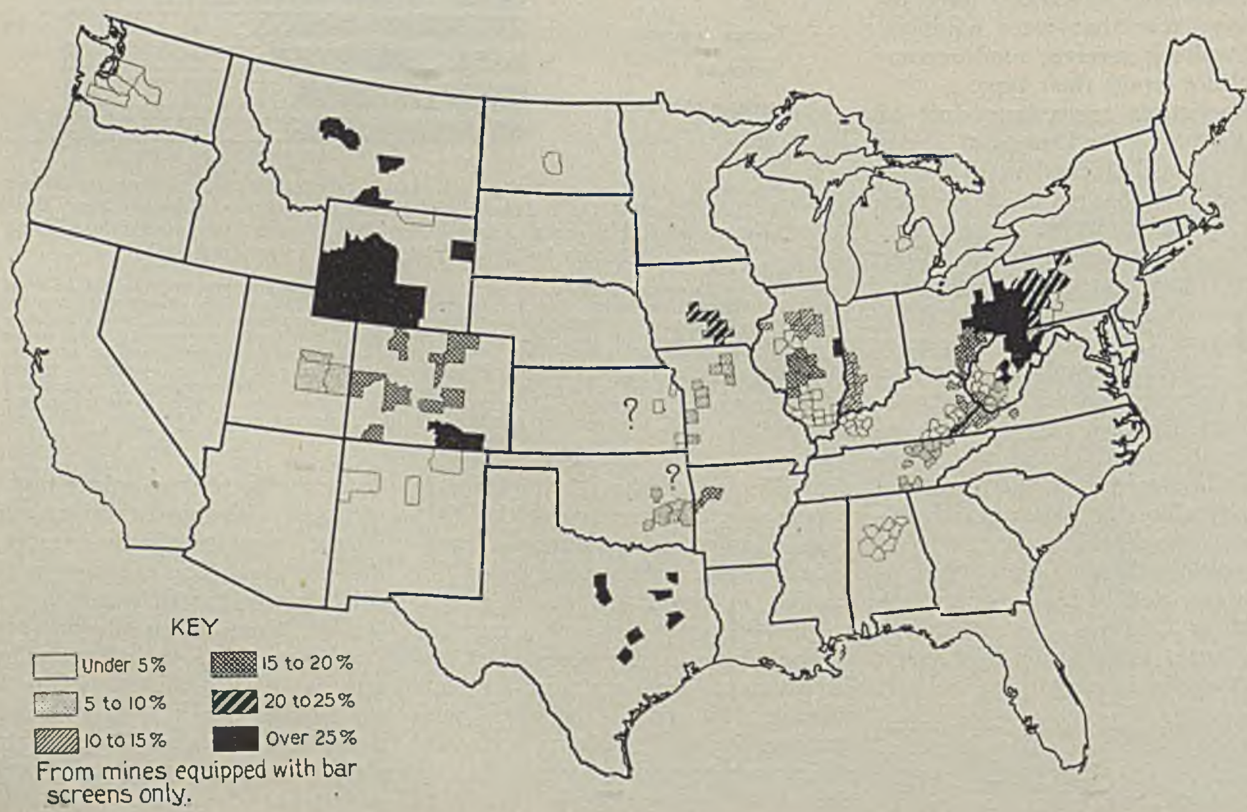


Fig. 2 (above)—Fields Where the Shaker Screen Is Most Extensively Employed

The areas in which shaker screens have been most widely adopted are the Eastern Interior fields and the Middle and Southern Appalachians. The shaker screen is the dominant type also in Washington, Utah, New Mexico, Colorado, northern Wyoming, Michigan, and parts of Pennsylvania. Shading represents percentage of total shipments from screen-equipped mines which came from mines using shaker screens either exclusively or in combination with other types.

Fig. 3 (below) Fields Where the Bar Screen Is Still Used

This map shows the bituminous fields where bar or gravity screens are still widely used, the most important of which is the heavily shaded area centering around Pittsburgh and including Pennsylvania, Ohio, and northern West Virginia. Bar screens are in use also in the Northern Rocky Mountain region, where most of the output is consumed by the railroads. Data for the Southwestern Interstate field are incomplete and understate the proportion of bar screens. The shading represents the percentage (of the total shipments from screen-equipped mines) which came from mines using bar screens exclusively. A considerable number of mines use bar screens in combination with shaker screens, especially in Alabama, but such mines are included in Fig. 2.



gravity screens; (4) mines using screens (as indicated by shipments of prepared sizes) but not reporting their type.

The number of mines using revolving screens was so small that they could not be shown separately without revealing individual operations, and they are, therefore, placed in the column headed "Unspecified." For the same reason a few mines reporting the use of vibrating screens have been grouped with the mines using shaker screens. This arbitrary classification, however, does not materially affect the proportions. Only 0.9 per cent of the total shipments was made by mines using revolving screens and a still smaller percentage by mines using vibrating screens.

The column headed "screens of type unspecified" includes mines that reported shipments of prepared sized coal but failed to reply to the question asking the type of screen employed. It also includes all mines known to ship prepared sizes that were not listed in the Keystone Catalog. A great many of the mines in this "unspecified" group doubtless use shaker screens, although still others are too small to justify the installation of expensive equipment and are more likely to employ bar or revolving screens.

MORE than half the output of bituminous coal is marketed as mine-run, and in some districts nearly the total output is so marketed.‡ The figures in the accompanying table do not show the quantity of coal screened; they give only the total shipments from screen-equipped mines. They show the coal that might have been screened, not the coal screened. Even with this limitation, many districts report a very small percentage of the total shipments from screen-equipped mines, as indicated by the first column of the table, which shows the percentage of shipments from mines equipped with screens in each state or district.

For the country as a whole 79.6 per cent of the total shipments in 1927 was made from mines equipped with screens of some type, but the proportion in different districts varies widely. In Illinois, for example, close to 100 per cent of the shipments in most of the producing districts was made from mines equipped with screens, whereas the screen-equipped mines in the Somerset district of Pennsylvania made only 20.9 per cent of the shipments and those in the Connellsville district only 30.2 per cent.

The shaker screen is now the dominant type. The mines using shaker screens (including the small number with vibrating screens) shipped 64.3 per cent of the output from screen-equipped mines and 71.6 per cent if to these mines are added those using shaker screens in conjunction with bar screens. Mines equipped with gravity bar screens shipped 18.9 per cent of the output, and mines that did not specify the type of screen employed shipped 9.5 per cent.

The type of screen installed varies surprisingly between fields, as is shown by the bar chart (Fig. 1), in which the principal producing fields are arranged according to the proportion of shipments from mines using shaker screens either alone or in combination with bar screens. Judged by this standard, modern screening practice has been most extensively adopted in southern Illinois, where 80.7 per cent of the tonnage was shipped from mines equipped with shaker screens, 14 per cent from mines using a combination of both shaker and bar screens, and only 5.3 per cent from mines either equipped with bar screens or not specifying the type of screen employed. Closely following southern Illinois were western Kentucky, the Kanawha-Logan-Kenova-Thacker area of West Virginia, Alabama, Indiana, and a number of other districts.

Among the factors determining the type of screen employed perhaps the most important are kind of coal, character of market demand, and age of field. Between these factors there is more or less overlapping and the effects of all three may be felt in a single district. Soft and friable coals yielding a small percentage of lump are less adapted to close screening and sizing than harder coals, and many of the differences in screening practice in the several fields are explained in this way. Again, the exceptional character of the Connellsville coals has caused them to be reserved almost exclusively for coking. For this reason few of the mines of that area are equipped with screens, and most of those that have installed screening equipment have found that bar screens were sufficient. Out of the 162 mines operating in Fayette County, Pennsylvania, in 1927 only 12 had shaker screens.

The influence of the character of demand is illustrated by the Pittsburgh district. The Pittsburgh and Youghiogheny coals are hard enough to produce a high percentage of lump, and as house fuels they compare favorably with other high-volatile coals. In this district, however, the demand for domestic fuel has been overshadowed by the very large requirements of the metallurgical industries, while the lake cargo trade did not encourage the differences of prepared sizes. In consequence, many mines in the Pittsburgh district have continued to use bar screens.

THE property of a steel company in eastern Kentucky is another example of the influence of demand. This mine is relatively new and no expense was spared in designing its equipment. The coal produced is suitable for many purposes, but it is used by the parent company chiefly in byproduct ovens, and consequently only bar and grizzly screens have been installed.

Other things being equal, the older the district the less it is likely to use shaker screens, simply because mines laid out a generation ago naturally used the equipment of their time. No small part of the difference in equipment from field to field is due to this simple fact of age.

The geographic distribution of the fields that have gone farthest in installing shaker screens is shown in Fig. 2. The fields in which 80 per cent or more of the screen-equipped mines are provided with shaker screens are shown in solid black; the fields using shaker screens to a less extent are shown by lighter shading.

Shaker screens have been most widely adopted in the Eastern Interior fields and the Middle and Southern Appalachian districts. Illinois has the distinction of being among the first of the bituminous fields to introduce improvements on the bar screen. A reciprocating screen was installed in the Williamson field in 1884, and even before that time revolving screens had been used for rescreening bar-screened coal.§ The first shaker screen used in Illinois was installed at the Gillespie mine, about 1890. In 1927, 83 per cent of the shipments in Illinois were made by mines that used shaker screens, either exclusively or in combination with bar screens.

The shaker screen is widely employed also in Washington, northern Wyoming, Utah, New Mexico, Colorado, Michigan, parts of Penn-

‡For detailed figures see previous article by the authors: "Fitting Product to Consumer's Needs," *Coal Age*, January, 1929, pp. 30-32.

§E. A. Holbrook and Thomas Fraser, "Screen Sizing of Coal, Ores, and Other Minerals," Bureau of Mines Bulletin 234, p.7.

sylvania, and other districts where the demand is diversified. Fig. 3, which is the reverse of Fig. 2 (with denser shading), shows the districts in which gravity bar screens are still extensively employed. Outstanding among these districts is, of course, the heavily shaded area centering around Pittsburgh, where the demand is overwhelmingly for industrial coal. The importance of the lake trade in Ohio, western Pennsylvania, and northern West Virginia and the former preference of this trade for bar-screened lump tended to perpetuate the bar screen in these districts long after it had been displaced elsewhere by other types. As it was necessary to rescreen the coal at the Head of the Lakes anyway, there was small incentive for screening the coal into a number of sizes at the mines and the incentive became even less after 1916 when the lake trade turned from bar-screen lump to run-of-mine. Bar screens are still widely used in the northern Rocky Mountain region, where much of the output is consumed by railroads. The bar screen still predominates also in the old Danville district in Illinois, one of the earliest coal-producing fields in the Middle West, and in parts of the Southwest.

But even in its last strongholds the bar screen is steadily giving way to shaker screens. In Maryland, the Southwest, northern West Virginia, Pennsylvania and Ohio the observer is impressed by the growing number of mines that have installed the latest form of screening equipment. This tendency is illustrated by the central preparation plants recently placed in operation in the Pittsburgh district and elsewhere which represent the last word not only in screening and sizing but in mechanical cleaning.

Bituminous Coal Shipped From Mines Equipped With Shaker Screens, With Gravity Bar Screens, and With Both Shaker and Gravity Screens, and From Mines With Screens of a Type Unspecified

(Note that the figures represent all coal shipped from mines equipped with screens, including run-of-mine as well as screened coal. They do not include coal shipped from mines that had no screens. Period covered is 1927. Classification by type of screens based on Keystone Coal Buyers' Catalog.)

State and Producing Field	Percentage of District Shipments That Came from Mines Equip'd with Some Type of Screen	Number and Tonnage of Mines Equipped with: Shaker Screens — Number of Mines	Shaker Screens — Thousand Tons Shipped	Shaker and Bar Screens* — Number of Mines	Shaker and Bar Screens* — Thousand Tons Shipped	Bar or Gravity Screens — Number of Mines	Bar or Gravity Screens — Thousand Tons Shipped	Screens of Type Unspecified† — Number of Mines	Screens of Type Unspecified† — Thousand Tons Shipped	Total, All Types of Screens — Number of Mines	Total, All Types of Screens — Thousand Tons Shipped	Percentage of Total Tonnage: From Mines with Shaker Screens	From Mines with Shaker and Bar Screens	From Mines with Bar or Gravity Screens	From Mines with Screens of Type Unspecified	From All-Screen Equip'd Mines
Alabama	84.7	55	8,685	31	‡5,132	9	505	18	1,665	113	15,987	54.3	‡32.1	3.2	10.4	100.0
Arkansas	85.3	20	607	4	126	12	231	18	329	54	1,293	46.9	9.7	17.9	25.5	100.0
Colorado	95.5	74	5,231	12	820	14	1,509	14	596	114	8,156	64.1	10.0	18.6	7.3	100.0
Georgia	100.0	......	......	......	......	1	72	......	......	1	72	......	......	100.0	......	100.0
Illinois	99.4	156	31,049	22	3,812	14	3,961	32	2,878	224	41,700	74.4	9.1	9.6	6.9	100.0
Northern Illinois	100.0	8	458	1	23	1	65	1	11	11	557	82.2	4.1	11.7	2.0	100.0
Fulton-Peoria	93.2	12	1,852	1	15	1	14	7	480	21	2,361	78.4	0.6	0.6	20.4	100.0
Danville	99.7	2	343	......	......	2	1,811	2	195	6	2,349	14.6	......	77.1	8.3	100.0
Central Illinois	99.7	36	8,485	6	633	7	1,973	7	720	56	11,811	71.8	5.4	16.7	6.1	100.0
Belleville	99.3	33	3,279	5	376	2	69	9	458	49	4,182	78.4	9.0	1.7	10.9	100.9
Murphysboro	70.6	3	675	......	......	......	......	1	1	4	676	99.9	......	......	0.1	100.0
Southern Illinois	92.4	62	15,957	9	2,765	1	29	5	1,013	77	19,764	80.7	14.0	0.2	5.1	100.0
Indiana	93.8	74	11,271	14	1,486	35	2,228	11	735	134	15,720	71.7	9.5	14.2	4.6	100.0
Iowa	94.8	16	1,099	4	149	29	485	12	302	61	2,035	54.0	7.3	23.8	14.9	100.0
Kansas	82.4	31	1,295	8	403	4	42	37	756	80	2,496	51.9	16.1	1.7	30.3	100.0
Kentucky	91.7	296	48,093	17	3,154	46	5,226	54	5,480	413	61,953	77.6	5.1	8.4	8.9	100.0
Western Kentucky	91.1	77	15,888	5	949	4	272	12	1,719	98	18,828	84.4	5.0	1.4	9.2	100.0
Northeastern Kentucky	88.5	82	12,566	10	1,669	31	2,591	22	1,931	145	18,757	67.0	8.9	13.8	10.3	100.0
Hazard	98.7	50	6,596	......	......	2	23	3	266	55	6,885	95.8	......	0.3	3.9	100.0
Harlan	96.4	45	9,449	1	530	1	2,226	5	690	52	12,895	73.3	4.1	17.3	5.3	100.0
Southern Appalachian	85.7	42	3,594	1	6	8	114	12	874	63	4,588	78.3	0.1	2.5	19.1	100.0
Maryland	29.9	9	548	4	77	3	41	2	139	18	805	68.1	9.6	5.1	17.2	100.0
Michigan	100.0	7	697	......	......	......	......	......	......	7	697	100.0	......	......	......	100.0
Missouri	82.1	34	1,594	5	148	6	150	9	244	54	2,136	74.6	7.0	7.0	11.4	100.0
Montana	69.2	7	681	3	101	3	635	5	514	18	1,931	35.3	5.2	32.9	26.6	100.0
New Mexico	97.6	7	1,444	5	1,178	2	81	4	53	18	2,756	52.4	42.8	2.9	1.9	100.0
North Dakota	92.7	8	958	......	......	5	45	3	121	16	1,124	85.2	......	4.0	10.8	100.0
Ohio	89.5	92	5,651	9	333	94	3,716	34	2,065	229	11,765	48.0	2.8	31.6	17.6	100.0
Northern and Eastern	88.0	52	3,538	3	51	61	3,060	21	1,660	137	8,309	42.6	0.6	36.8	20.0	100.0
Southern	93.4	40	2,113	6	282	33	656	13	405	92	3,456	61.1	8.2	19.0	11.7	100.0
Oklahoma	79.7	36	1,645	2	105	10	252	20	946	68	2,948	55.8	3.6	8.5	32.1	100.0
Pennsylvania	53.4	158	27,540	12	2,844	200	26,448	40	5,239	410	62,071	44.4	4.6	42.6	8.4	100.0
Broad Top	54.5	8	381	2	72	2	14	1	1	13	468	81.4	15.4	3.0	0.2	100.0
Central Pennsylvania	39.2	58	8,101	3	668	47	2,972	6	317	114	12,058	67.2	5.5	24.7	2.6	100.0
Northwestern Pennsylvania	71.3	17	2,038	2	379	36	2,191	8	858	63	5,466	37.3	6.9	40.1	15.7	100.0
Pittsburgh	85.8	53	12,357	2	262	52	8,854	18	1,334	125	22,807	54.2	1.1	38.8	5.9	100.0
Westmoreland	71.3	9	2,262	......	......	41	7,456	6	2,421	56	12,139	18.6	......	61.4	20.0	100.0
Connellsville	30.2	10	1,881	2	660	18	4,517	......	......	30	7,058	26.6	9.4	64.0	......	100.0
Somerset	20.9	3	520	1	803	4	444	1	308	9	2,075	25.1	38.7	21.4	14.8	100.0
Tennessee	79.5	26	3,381	2	43	14	419	7	467	49	4,310	78.4	1.0	9.7	10.9	100.0
Texas	26.6	......	......	2	51	7	292	......	......	9	343	......	14.9	85.1	......	100.0
Utah	99.9	13	2,394	7	1,428	3	272	2	464	25	4,558	52.5	31.3	6.0	10.2	100.0
Virginia	96.4	40	8,858	3	192	10	1,547	8	1,194	61	11,791	75.1	1.6	13.1	10.2	100.0
Washington	99.2	17	1,552	6	451	3	104	5	309	31	2,416	64.2	18.7	4.3	12.8	100.0
West Virginia	83.3	386	78,128	25	5,284	171	22,450	56	11,234	638	117,096	66.7	4.5	19.2	9.6	100.0
Cumberland-Piedmont	55.5	4	311	......	......	7	418	2	14	13	743	41.9	......	56.3	1.8	100.0
West Virginia Panhandle	94.6	10	2,622	1	372	12	2,306	1	7	24	5,307	49.4	7.0	43.5	0.1	100.0
Northern West Virginia	84.2	60	14,384	1	36	84	12,341	11	2,525	156	29,286	49.1	0.1	42.2	8.6	100.0
Kanawha	91.6	84	10,068	1	206	14	534	10	1,463	109	12,271	82.0	1.7	4.4	11.9	100.0
Logan	98.4	66	19,468	1	47	13	2,559	3	295	83	22,369	87.0	0.2	11.5	1.3	100.0
New River and Winding Gulf	72.4	80	15,178	10	1,939	20	2,111	14	3,384	124	22,612	67.1	8.6	9.3	15.0	100.0
Pocahontas	77.7	58	11,695	11	2,684	16	1,635	14	3,394	99	19,408	60.3	13.8	8.4	17.5	100.0
Kenova-Thacker	78.8	24	4,402	......	......	5	546	1	152	30	5,100	86.3	......	10.7	3.0	100.0
Wyoming	93.8	22	3,312	3	602	9	1,427	7	693	41	6,034	54.9	10.0	23.6	11.5	100.0
Total United States	79.6	1,584	245,713	200	27,919	704	72,138	398	36,423	2,886	382,193	64.3	7.3	18.9	9.5	100.0

*Includes mines reporting shaker screens in combination with revolving screens.

†Includes a small tonnage amounting to only 0.9 per cent of the United States total from mines reported as equipped with revolving screens. The figures for this group were as follows: Alabama, 6 mines, 216,000 tons; Colorado, 2 mines, 73,000 tons; Kansas, 1 mine, 9,000 tons; Kentucky, 2 mines, 83,000 tons; Montana, 1 mine, 421,000 tons; Pennsylvania, 3 mines, 103,000 tons; and West Virginia, 2 mines, 217,000 tons.

‡In Alabama a considerable number of mines reported shaker screens in combination with revolving screens. The mines thus reporting shipped 1,687,000 tons of coal or 10.5 per cent of the state total.

Use and Abuse of

MINE-CAR WHEELS

By W. D. Hockensmith

President and General Manager
Hockensmith Wheel & Mine Car Co.

THOUGH mine-car wheels with chilled treads and flanges have been manufactured and used in the United States for over sixty years, the first transportation units had no such provision for resisting wear. These early mines used light-weight small-capacity cars which were moved by man or animal power, the distance of travel was short and the annual output per mine was small.

With such conditions, the wheels, though they had unchilled treads and flanges, gave satisfactory service. But before long these favoring conditions changed and a wheel with the tread and flange hardened by chilling was demanded. For the information of readers who are not familiar with the method of manufacture of such wheels a short description is given.

For the casting of these wheels patterns are used like those in regular foundry practice, but in the molds are placed cast-iron annular rings opposite the parts in the casting that will form the wearing surface of the tread and flange. Special-mixture iron is used in the making of these wheels and, when melted and poured into the molds, this melted iron comes in contact with the cold annular ring, giving it the required white chill. This enables the parts which receive it to resist wear. The depth of the chill varies with the thickness of the tread and flange. White-chilled cast iron is brittle, and to insure wheels against breakage, the depth of the chill must be limited. Yet wheels must not be excessively heavy; their weight is limited by several considerations: (1) the strength required; (2) the depth of chill on tread and flange; and (3) the amount of tread wear to be obtained.

Wheels of large diameter give longer service than smaller wheels and are not so seriously affected when spots on the treads wear flat. The smaller the diameter of the wheel the shorter the life which can be expected from the tread in actual miles of car travel.

White-chilled cast iron has been carefully tested by the many methods commonly used to ascertain the comparative hardness of materials. These tests show that the hardness of white-chilled cast iron is practically constant, even though there may be a considerable variation in the chemical composition of the material.

THAT being so, the life of the tread is limited to the depth of wear that can be permitted. Users vary in their opinion as to what these limits should be; few, if any, advocate discarding a wheel having less than $\frac{1}{4}$ in. of wear and few would keep it in use after the wear has exceeded $\frac{3}{8}$ in. This must be understood to mean that a groove $\frac{1}{4}$ to $\frac{3}{8}$ in. deep will extend around the entire tread of the wheel where it runs on the rail. It refers to complete peripheral wear and not to flat spots. Wheels worn to this extent give trouble by derailments when crossing frogs and switches, and should be replaced.

When wheels are worn evenly all around the tread, as described above, they are regarded as having given satisfactory service. The number of years these wheels will be serviceable is dependent entirely on the ton-miles of travel. This has been carefully checked in a number of mines and it has been ascertained that 70,000 to 80,000 ton-miles is average service.

The use of heavy cars in long trips moving at high speeds over long distances makes it necessary that efficient brakes, skids or sprags be used on gradients, for mine locomotives cannot control such long trips. This explains why wheel replacements are more frequent now than in earlier years. But brakes properly designed and intelligently applied will lengthen the life of mine-car wheels.

> ## New!
>
> *Recent developments in coal-getting equipment include a machine similar to the pit-car loader which assists its crew by digging its own coal, as well as a heavy mobile-type loading machine with car-trimming features and a telescopic loading head capable of covering a half-circle 36 ft. in diameter.*
>
> *The characteristics of these machines, which have been installed in a West Virginia mine, will be described in an early issue of* COAL AGE *by a member of the editorial staff who recently studied their operation.*

A car wheel of any type if prevented from turning and allowed to slide on sanded rails will wear a flat spot on its tread in a short distance. A wheel in this condition cannot be used for modern haulage as it will not only rack the mine cars but spill a large quantity of coal along the road bed, and this everyone now recognizes as an unsafe practice. When wheels have flat spots $\frac{1}{8}$ in. deep they usually are unfit for further use. When wheels of 14-in. diameter are worn flat to a depth of $\frac{1}{4}$ in. they have a flat spot $3\frac{3}{4}$ in. long.

Mine-car wheels have been designed and are now in use, both of roller- and plain-bearing types, that take care of the hub wear under the various conditions encountered in the mine. What is needed is some change in the operation of cars that will permit their tread and flange wear to be reduced. The railroad companies to a large extent have solved their flat-wheel problem by the proper design of air brakes which effectually prevent the sliding of wheels when cars are under load, and it would seem that the coal industry should follow suit.

Putting the Record Straight

In the issue of May, James H. Pierce, in his article entitled "The Thought of Europe as It Bears on Our Problems," is represented as saying "I predict that the logical development of the next few years will be toward combination plants using wet washers on material ranging probably from 4-in. mesh down to $\frac{1}{8}$-in. and dry washing of the fines." Mr. Pierce writes from Kharkoff, Russia, that this $\frac{1}{8}$-in. should be $1\frac{1}{8}$-in.

Fifteen Feet of Cover to

By C. M. Young
Professor of Mining Engineering
University of Kansas
Lawrence, Kan.

Lifting Box of Coal Over High Wall to Train of Cars

SOME years ago, soon after the large steam shovel had been developed, the public began to take a lively interest in equipment of that type because of the important part it was taking in the excavation of that national undertaking, the Panama Canal. At the same time unbeknown to the multitude, the largest shovel in the world was at work in the Kansas-Missouri stripping field.

Today that field still retains its distinction, for even now it can claim that the largest shovel that the world ever saw is used in the stripping of its coal seams. It may be remembered that it was here also that the steam shovel was first applied to coal stripping and that it was in this district that no small part of the ingenious equipment specially designed for coal stripping was planned.

Steam shovels for coal stripping were first used in 1877. Though the very first shovel was successful, coal which had an overburden thin enough for profitable removal with a small shovel was limited, so the supply was soon exhausted and the stripping industry lagged. Shovel manufacturers said that larger equipment would be impractical, and no important advances were made in this field for about 30 years, though several types of equipment were tried near Danville, Ill.

Then, after the largest revolving shovel had proved itself in the latter field, it was brought into the Kansas-Missouri district in the largest size then available. Since then shovels have grown far larger, and pit practice and equipment have undergone important changes.

Certain conditions are necessary, of course, to make possible profitable stripping with any equipment, and certain optimum requirements are essential to make such operations possible where the coal is thin and destined for a market not by any means too favorable. Fortunately, the local physical conditions in the Kansas-Missouri field favor stripping. The Pennsylvanian strata, in which the coal occurs, dip gently to the west of north. The surface, while not level, has no abrupt slopes except in stream valleys. The overburden consists of soil, shale, and occasionally sandstones.

The shale generally can be dug without shooting, but is shot where found to be unusually hard. The sandstone also is shot if it is thick enough to slow down the shovel or if digging it without shooting would strain the equipment too severely. It is estimated that less than 26 per cent of the overburden is shot. The conditions permit the shovel to move a full dipper of earth at nearly every swing.

In the early days of the district the coal next to the outcrop was largely exhausted with horse scrapers, where approach to the crop line by shaft mining was limited by the occurrence of poor rock. The weathering which weakened the rock and made underground mining difficult bettered conditions for the stripper. Old workings are still sometimes encountered in stripping operations, and they give trouble not only because coal to remunerate the stripper is missing but because the old workings interfere with the moving of the shovel (Fig. 3).

The principal coal bed, known as the Cherokee or Weir-Pittsburg, varies in thickness from about 54 in. at the southwest end of the field to 28 in. at the northeast. The greater part of the stripping is in coal 3 ft. thick or a trifle thicker. This bed has one unfortunate feature, the presence of numerous clay veins, locally termed horsebacks. These run in all directions and vary in width from a few inches up to 3 or 4 ft. It has been found that approximately 13 per cent of the bed is composed of these horsebacks, which cannot be loaded with the coal but must be removed separately by the loader.

Above this main bed are others in the Cherokee formation. There are probably four of these, three of which occur within the limits of this field and under such conditions as to be stripped, and all are being worked. As they lie above the Weir-Pitts-

One Foot of Coal

No Deterrent to Southwest Strippers

burg bed and dip to the north of west, their outcrops are found farther west and north than that of the main bed. They have not been worked from shafts to any appreciable extent. They are thinner than the main bed. The lowest is about 14 in. thick and the next about 22 in. For the third I have no available figures, but it probably is safe to say that it is less than 18 in. thick.

These are thin coal beds, but thick enough to be worked where the ratio of overburden to coal is not excessive. All are receiving attention with the decrease of available coal in the Weir-Pittsburg bed. The 22-in. seam is specially prominent. At present there are three large plants operating on this bed, with two others in preparation. The upper bed is being worked at two pits, one of which is equipped with a 10-yd. electric shovel.

The character of the overburden therefore is favorable. And there is one other physical feature, determined by the relation of geological structure to topography, that is rather unusually auspicious and that is that the coal is only slightly warped and the dip is from 20 to 25 ft. per mile. The surface, also, though it has sufficient relief to give fair drainage, rolls but slightly.

It is a common estimation that the ratio of overburden to coal, with efficient equipment and good management, may be as much as 15:1. Thus if coal is 3 ft. thick, 45 ft. of overburden may be removed. Probably that thickness is not reached at any pit in the district at the present time except where some little mound occurs entirely surrounded by lower ground.

If it is assumed that the limiting depth of overburden is 45 ft. and that good coal can be found nearly to the outcrop, it will be found that there is a width of strippable coal of considerable more than a mile. In all cases the coal must be prospected by drilling, for many places are found in which the coal is too thin for operation or entirely lacking. However, it is still possible to find extensive areas of stripping coal.

In the examination of coal land with a view to stripping, lines similar to contour lines can be drawn through points of equal ratio of overburden to coal and then, by the use of a planimeter, it is easy to calculate the quantity of dirt which must be removed per ton of coal over various areas, and to ascertain the cost of producing a ton of coal by stripping methods.

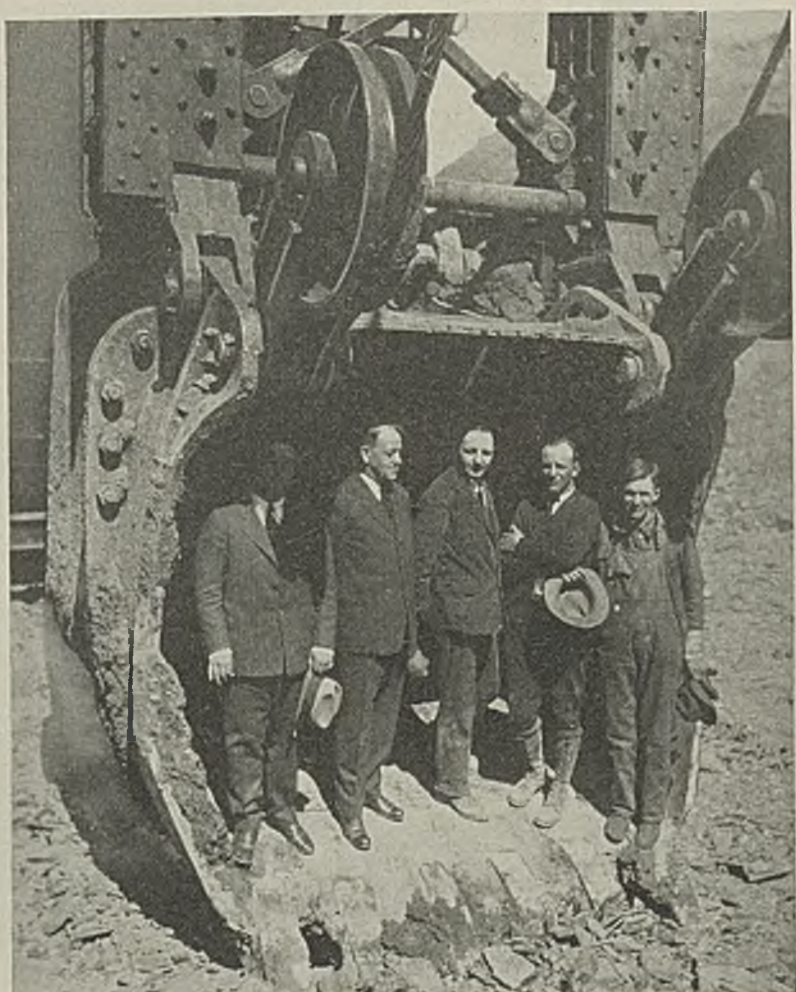


Fig. 1—Bucket of Largest Shovel. Left to Right, Harold Spencer, C. H. Spencer, K. A. Spencer, H. C. Widmer and Charles Williams

Emphasis should be laid on the fact that the ratio of overburden to coal has increased, within a period of five years or less, from about 10:1 to 15:1. This increase of 50 per cent is not due to a more favorable market or to any change in labor conditions but to the development of machinery which will move dirt more cheaply and to refinements of operating methods.

The cheaper stripping of overburden has been brought about by the extensive use of electrical power and the building of shovels of large capacity, mounted on caterpillar trucks.

The use of electrical power eliminates the trouble and expense of supplying boiler water and the delay and cost of getting up steam. It also permits operation with less labor. The steam shovels require an engineer, an oiler, a craneman, a fireman, and a coaler, the last a man who works in the pit. The electric shovels require only an engineer and oiler and one man in the pit. The oiler can help there also if he should be needed when the shovel is moving up. But the labor bill per shovel is not all that is to be considered, for the electrical shovel swings a little faster than the steam, and thus lowers the labor cost per cubic yard removed.

The size of shovel is increased simply to permit of the movement of more dirt per swing. Until the beginning of the year 1928 the 225 Bucyrus and the 300 Marion were considered the big shovels and a 6-yd. dipper was the maximum with the possible exception of one 7-yd. Today the maximum is 16 cu.yd. The larger shovels have a higher cost of operation, not because of increased labor cost but only because of the interest on the larger investment, and the increased consumption of power and oil; otherwise the operating cost is the same as that of the smaller electrical shovels and less than that of steam shovels.

The cost of power is closely proportional to the quantity of dirt moved. The investment is large: the largest shovel, erected and ready for work, costs about $200,000.

The introduction of these larger shovels has been rapid. There are now operating in the field 110 shovels ranging in size from $1\frac{1}{4}$ yd. to 16 yd., almost equally divided between Bucyrus and Marion. Within a year ending July, 1929, two 8-yd. shovels, three 12-yd., and one 16-yd. have been added. Only one of these, an 8-yd. unit is operated by steam. Another 12-yd. shovel will be erected soon.

The first large electrical shovel was put to work about five years ago. This was a Bucyrus 225-B, driven by alternating-current motors and mounted on flanged-wheel trucks.

Two important improvements have been made since then. First, the alternating-current motor drive has been abandoned and direct-current motors with Ward-Leonard control substituted. The principal advantages of this control are better power factor and lower momentary peaks; more accurate control of shovel motion; greater flexibility than with alternating-current equipment. This third point means that the direct-current motors operate at the same efficiency in different types of digging, something which could not be accomplished with alternating-current motors without changing the gear ratio with each change of digging conditions. The operation of these large shovels is almost incredibly smooth and easy.

The second great improvement is the mounting of the machines on caterpiller trucks. The largest of these shovels weighs approximately 1,000 tons; if anything more rather than less. Crawling trucks, which had been easy to design for small shovels with rigid trucks, required very careful reconsideration when designed for large ones, but the ease and quickness of movement possible with caterpillars were such great advantages that the difficulties simply had to be met.

When wheeled trucks were used, as they still are on all the old shovels, it was necessary to lay track and to ballast it after a fashion. The track continually was being torn up behind the shovel and relaid in front. This required labor, and the actual moving of the shovel consumed appreciable time. In the absence of accurate data, I presume that it could not be done in less than two minutes and probably would take five.

The caterpillar-mounted shovels move quickly, and no labor is used in laying track. In the case of the 16-yd. Bucyrus of the Pittsburg & Midway Coal & Mining Co. the average time required for moving up is 8 minutes in an 8-hour shift and the time required for each move is about one-half minute. Under ordinary conditions there is nothing to be done except to release the support of the upper frame, that is to open the communicating pipes of the hydraulic jacks on the Marion or to release the screw jacks so as to give three-point support on the Bucyrus, move up, and set the jacks again. These jacks are operated by motors.

Behavior of the crawling trucks on rough ground is shown in Fig. 3. Here an 8-yd. shovel is seen moving over coal previously worked from a mine shaft. Ties have been used to block up one of the old entries, and the trucks are shown passing over it. As can be seen, each truck swings around a horizontal shaft so that either front or rear can rise or drop, and the two trucks are hinged on another horizontal shaft so that either one of the pair may be higher or lower than the other.

In digging with good equipment and with operations well planned, about 62 per cent of the time is occupied in swinging the shovel. This is a minimum which can be attained only if the shovel swings as rapidly as is possible and the swings are as short as possible. The arc of swing is measured by an indicator in

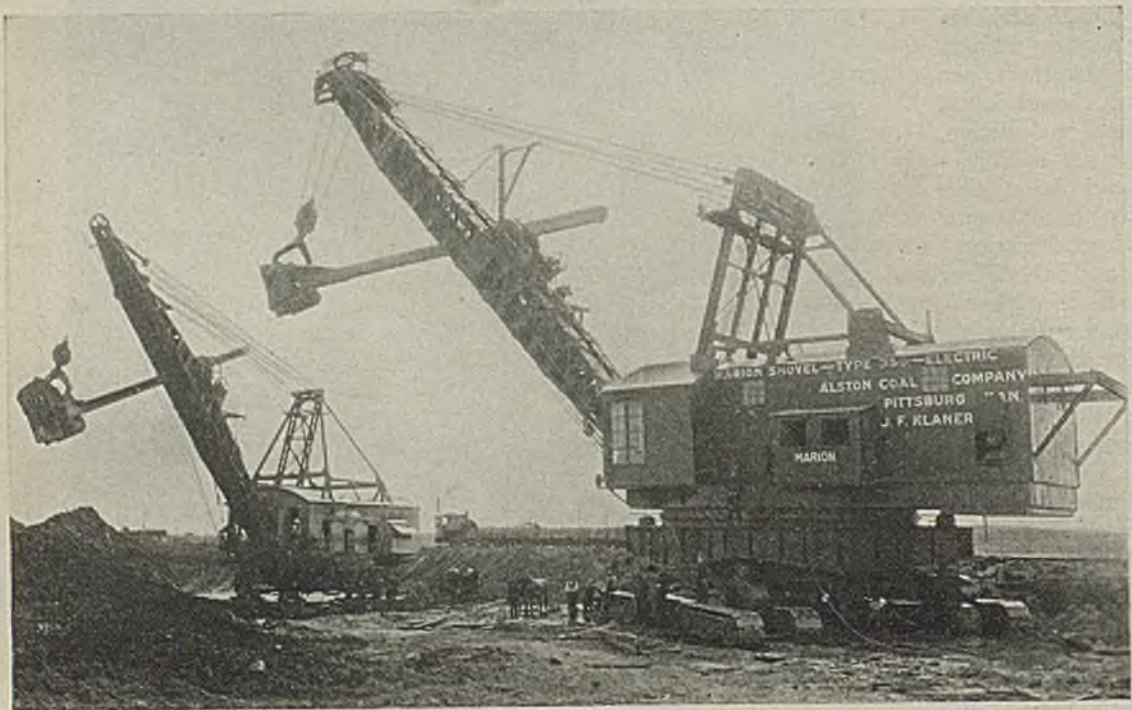


Fig. 2—Wheel Trucks and Alternating Current Give Place to Caterpillars and Direct Current

Fig. 3—Caterpillar Trucks Working on Rough Ground

the cab. To make the swing short, the dirt nearest the "high wall" is dumped first into a "pilot wall," and the remainder of the dirt is stacked behind this. Finally the shovel takes a few cuts from the toe of this wall and leaves the dirt standing on an average inclination much steeper than the angle of repose. The actual length of the digging cycle of a modern electric shovel is about 42 seconds.

Naturally the record for dirt movement is held by the 16-yd. shovel. It has moved 288,720 yd. in 36 shifts and can consistently move from 7,500 to 8,000 yd. per shift. In 1928, 230,426 tons of coal was loaded at this pit after being uncovered by a 10-yd. shovel. The schedule for the present year is 330,000 tons, and the shovel is several thousand tons ahead of schedule.

The haulage problem is receiving much consideration. Two methods have been used. In one of these track is laid from the tipple into the pit and the coal is loaded directly into mine cars. This involves laying track on the coal. This track has constantly to be torn up and relaid. At least one company uses 60-lb. rails and lays track on the specifications prepared by railroads for the laying of their own curves and switches. The maximum grade is 2½ per cent. This company uses 10-ton bottom-dump cars and will soon introduce cars of 15-ton capacity.

In the other method of haulage, track is laid along the top of the high wall and coal is loaded into boxes or skips which are lifted out of the pit by a crane called a "bank machine." The box commonly has the same capacity as the car and has a bottom dump. In a few cases the cars themselves are handled by the bank machine, which is a small revolving crane with a long boom. It is shown on page 480. It has been the custom to use ordinary mine cars on the bank, but one company which is planning the equipment for a new pit expects to use 37-ton cars.

Another company is introducing truck haulage, using 5-ton trucks. The maximum grade out of the pit will be 4 per cent. The experiment will be watched with interest. If it can reduce haulage cost by 1c. per ton, as is expected, it will be considered a success.

In the preparation of the coal there has been little recent change except in the thoroughness of the process. The coal is sized on the usual shaking screen and is picked by hand. In summer the lump coal is crushed. The rather bad reputation of early strip coal has led present-day operators to take unusual care that their product shall be clean. In this effort

Fig. 4—Sixteen-Yard Shovel With 85-Ft. Boom

their plans have been successful and a large retail dealer said recently that he considered the stripped coal at least as desirable as that from shaft mines. One company is considering the installation of a washery for the smaller sizes.

One of the physical conditions which makes the loading of clean coal difficult is the presence of the clay veins (horsebacks) already mentioned. If these are removed by the coal loader some of the clay is almost inevitably mixed with the coal. One operator is building a machine to dig out the clay veins ahead of the loader.

Probably the most noticeable feature of operations in the district, aside from the capacity of recent equipment, is the attention to every detail in operation with the purpose of saving a fraction of a cent in cost per ton here and another fraction there. This applies to all operations from the opening of the pit to the loading of the sized and picked coal. Stripping has become an engineering proposition with its purpose the loading of the cleanest possible coal at the lowest cost.

Every detail is watched and studied from the engineering point of view. In the beginning the field is prospected by drillholes at 660-ft. intervals, in some cases closer; the ratio of overburden to coal is calculated, with the character of overburden and probable amount of bank shooting necessary. Surface topography is studied to determine the system of drainage and to ascertain the quantity of tiling or ditching needed. The rate of digging and angle of swing of the shovel are watched for possible improvement. The same is true of the loader and of the haulage.

Acknowledgment should be given to Joseph F. Klaner and K. A. Spencer for assistance in preparing this review.

Do Superintendents and Foremen Have a Stake in MANAGEMENT?

*By John Marland**

General Superintendent
Kentucky Harlan Coal Co.

SUCCESSFUL management in mining, as in other pursuits, means ability to direct skillfully and economically. Because of the many duties and intricacies of a coal-mining plant, the operator is obliged to deputize other men—superintendents, mine foremen and assistants, outside foremen, etc.—and divide the management among them. As the job is too large for one man alone, responsibility necessarily must be shared. And as each is but one tooth in the wheel, in order that the wheel may work each must be fitted for his position and mesh—or co-operate —with the rest.

Probably the most successful mines are those where the operator holds one man responsible. This man, logically, is the local superintendent. He should be a man versed in the practical and technical aspects of the art of mining so that his subordinates will cheerfully be guided by his decisions. On the other hand, he should not be a "know-it-all," as that is impossible, but as someone must have the last word that man should be the superintendent.

Next in line is the mine foreman, who should be a man of good judgment, well versed in human nature and able to place men where they will produce the best results. Fitting an employee to his job means a reduction in labor turnover—an expensive proposition at the best.

Preparation is perhaps one of the most important duties of a mine superintendent and his assistants. If we suppose that block coal is selling for $2.50 a ton and slack at $1, 30 per cent block is worth 75c., and 45 per cent slack, 45c. If the block production is increased to 31 per cent, its value is increased to 77.5c. Reducing the amount of slack to 44 per cent lowers its value to 44c. By this transaction, the value of the whole is increased 1.5c. For every per cent ash above the inherent ash, the value to the purchaser is decreased about 5c. per ton, part of which is freight and part loss in B.t.u. content. With even these few factors in mind it is not difficult to visualize the importance of preparation.

IMPROVED methods of mining have accompanied the introduction of the mechanical loader, of which there are a great many varieties. But this multiplicity of machinery brings in its train new problems and greatly increases the importance of the present-day management job over that of 25 or 30 years ago.

Several factors may be listed as important in the operation of a mine. The first in importance is ventilation, and the well-ventilated mine is the rule today rather than the exception. Second is good roads and tracks, as better track and cleaner roads make transportation—an essential item in a well-managed mine—easier, safer and more economical.

Safety has kept pace with all the improvements in equipment and mining methods, but the superintendent or subordinate who fails to take it into consideration will soon find that it takes a safe mine to be a successful one, from either the humanitarian or financial standpoint. The question of whether or not it pays has been answered by one mine manager who, over a period of years, has produced over two and a quarter million tons without a fatality inside and over one and one half million tons without a fatality in or around the mine. Today he enjoys a compensation insurance rate almost one-half the Kentucky base rate of $6.03.

The financial saving is evident, but who can measure the gain resulting from the elimination of suffering and deprivation on the part of the employee and his family? Formerly, a mine foreman took an accident or fatality as a matter of course, but today the live manager feels, and rightly so, that every accident of consequence should be carefully investigated and steps taken to prevent a recurrence. Strict adherence to a plan of this sort will yield surprising results.

The success or failure of any plant, be it coal mine or railroad, depends almost entirely on its management from the president on down, with the major responsibility resting on the operating men, who are really in charge. This fact is borne out in the experience of one company having several mines equipped with mechanical loaders. Outside of the loaders themselves, the most impressive factor in their success was the complete co-operation from president down to loader operative. This company began experimenting with mechanical loaders in 1925 and has since used a number of types. The firm's costs have been reduced 25 per cent on its entire production, of which 52 per cent is mechanically loaded. Other mines also report favorably on the use of machines and almost all of the managers lay great stress on proper supervision. Unless proper supervision can be had, it is not advisable to install loading equipment.

EACH individual mine presents its own problems and what may succeed in one may fail in another. Upon the management rests the responsibility of determining what method will eliminate the unnecessary spending of money with increased production costs. Results, after all, are the thing which interests the owner, as he has invested his money in the property and put it into the hands of the operating men to manage, relying on them for a return on his investment.

The successful management is the one that can get as nearly as possible 100 per cent efficiency out of all equipment. This responsibility rests on the superintendent and his subordinates, who must be able to place the employees in the positions they are best to fill. In so doing, their management is reflected on the cost sheet to the mutual satisfaction of the operator and themselves.

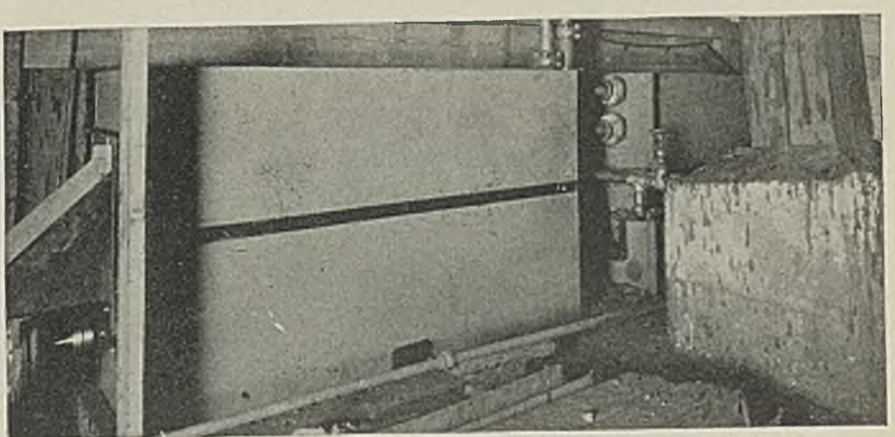
---

*Abstract of a paper entitled "Mine Management from the Viewpoint of the Operator," given before the Harlan Mining Institute, Harlan, Ky., July 6, 1929.

ANTHRACITE MINE

Heats Intake Shaft With Blast of Hot Air

By H. F. Brecker
Mechanical Engineer
Pine Hill Coal Co.,
Minersville, Pa.



Two of the Three Units That Keep Ice Out of Shaft

WHERE the hoisting shaft of a mine serves as the intake for ventilation, the water in the shaft during winter months freezes and interferes with the passage both of cages and air. The ice may freeze on the cage itself and may build up in sufficient quantity on the walls, guides and buntons to prevent the cages from passing up and down the shaft. Hoisting must then be stopped. While the ice is being removed the mine is idle and a distressing reduction in the day's output results.

This difficulty has been solved in an interesting manner at a three-compartment hoisting shaft of the Pine Hill Coal Co., Lytle, Pa. The shaft measures 11x24 ft. and is approximately 600 ft. deep. Two of the compartments are used for coal hoisting, and a third compartment for water columnways and cables. Down this shaft the mine ventilating system pulls approximately 100,000 cu.ft. of air per minute. As the shaft compartments are not separated by partitions, the air in traveling down the shaft distributes itself among them.

Much difficulty having been experienced from ice freezing in this shaft during wintry weather, plans were made to heat the air as it entered the shaft at the surface. It seemed evident that so large a quantity of air as 100,000 cu.ft. per minute could not be passed satisfactorily over a bank of heating coils or be heated by blast radiation. To do so would require a large area of coil surface and a housing would have to be built over the top of the shaft. This would entail much expense.

Therefore it was decided that a heating system be installed at the side of the shaft to raise a small stream of air to a high temperature. The air thus heated would be blown down into the shaft at high velocity with such turbulence that it would mix with the cold air. In this manner the entire volume of air passing down the shaft could be raised to the desired temperature.

It also was evident that the blower must provide such a high downward velocity at the point of discharge that the air, despite its lightness, would not rise and escape from the top of the shaft. Steam at 125 lb. pressure was available for this heating.

A high-velocity discharge type of unit heater commonly used for warming industrial buildings seemed likely to meet the requirements and to have the further advantage that it would make use of standard equipment. To give the capacity required and meet the space conditions under which the apparatus had to be installed, three high-velocity standard unit heaters were selected.

In determining the size of the units, calculations were made based on the heating of the 100,000 cu.ft. of air per minute to a temperature of 50 deg. F. in zero weather. It was concluded that the installation thus designed would have sufficient capacity to maintain the air in the shaft above freezing with outside temperatures as low as 150 deg. below zero and that therefore it would meet satisfactorily the most exacting conditions. It also would have sufficient capacity to meet average winter demands should the ventilating current of the mine be increased at some future date.

Three York Unit Heaters were installed, each having a manufacturers' rating of 1,890,000 B.t.u. per hour when operated on saturated steam at 125-lb. pressure, with entering air at 0 deg. F. Each heater discharges 12,900 cu.ft. of air per minute at an outlet velocity of approximately 1,700 ft. per minute. The temperature of the air leaving the heaters is about 150 deg. F.

The steam coils which heat the air are located at the top of the unit and fans are located at the bottom for pulling the air through the coils and blowing it thus heated downward through the side of the shaft. Each unit is 7 ft. long, 3 ft. wide and 6 ft. high.

The heating coils in these units are made up of Super-Fin extended surface copper radiation designed to operate on 200-lb. steam pressure. In this installation the full pressure is applied direct to the coils. Each unit is provided with three multi-blade, fully housed fans and three hot-air outlets. The fans are located on a single shaft supported by ball bearings outside the heater casing, and are driven by a single direct-connected 3-hp. 1,160-r.p.m. ball-bearing squirrel-cage motor, which latter is located outside the heater casing where the hot air cannot affect it.

The heaters are located along one side of the shaft, one unit discharging into each of the three shaft compartments. Hot air from the units is blown downward through openings provided in the side of the shaft about 4 ft. below the surface. By locating the heaters in this manner along one side of the shaft they do not interfere in any way with the cages or with operations at the surface. A roof of wood was erected over the heaters to protect them from any coal which might fall from the cars as they are dumped.

Particular care was taken to design the piping so as to assure a free drainage of condensate lest water should accumulate in the heater coils and should freeze in extremely cold weather. Each heater is equipped with an individual trap of ample capacity to assure free passage of condensate from the drain connection.

As the shaft air was maintained at all times above freezing temperatures no ice accumulated in any point in the shaft during the most severe weather of the past winter. By the installation of three units great flexibility in operation was afforded. Only in the most severe weather is it necessary to keep all three of them in operation. At temperatures not much below freezing one unit will warm the air to a suitable temperature. On colder days one or both of the additional units may be used.

Gas Ignitions from "Natural Causes" May Be Due to Piezo-Electricity

By D. W. Rees

Head of Mining Department,
Municipal Technical College, Mount Pleasant,
Swansea, Wales

IT IS possible that electricity generated by the piezo effect may have been responsible for certain cases of gas ignition in mines. The subject is worthy of investigation by practical men in mines and by scientific experts.

At inquiries into disasters at the Minnie Pit, Pendleton Colliery, Senghenydd, and Cwm Colliery in Wales, it has been repeatedly stated in written and verbal evidence that flashes of various colors accompanying roof falls or upheavals of the floor have been seen by persons near the disturbances. Apparently these effects have been attributed by the investigators to psychological factors or to the imagination of the observers, so that no consideration has been given to them and no experimental work has been initiated to see whether such flashes can be generated apart from the ignition of gas by white-hot particles.

Without exception the evidence has been that even where gas has not been previously found, the sudden rupture of the roof has been followed by the lighting up of the road or by the appearance of a floating luminous cloud. Mining literature has been singularly bare of any possible explanation of these occurrences, so that the attitude of the investigators may have some justification.

Piezo-electricity has been investigated in common with thermo-electricity and pyro-electricity by a few enthusiasts in pure science, but as the subject does not lend itself to mathematical analysis it has not received the attention it deserves. The prefix "piezo" means pressure, and this type of electricity is generated by pressure in the case of crystalline bodies only. If pressure is applied axially to certain crystals such as tourmaline or quartz, electric charges of opposite sign appear at the ends of the crystals.

This property, apparently related to the optical properties of the crystalline mineral, may be due to internal friction along slip planes or to disturbance of the equilibrium of the structure of the crystal, since the behavior of the crystal to polarized light alters appreciably. In fact, in microscopical work the strained condition of a mineral can be estimated by the effect on polarized light. The amount of charge is proportional to the applied pressure, and crystals have been used in this manner during the war for measuring instantaneous pressures generated by explosives.

THOUGH tourmaline is preferred for experiments of this kind, yet quartz can be electrified in the same manner. If a mass of quartz crystals with silicious infilling, as is observed in the case of rocks, is subjected to very great pressure, as in mining practice, it is not to be expected that the charge generated will be the sum of the separate charges on separate crystals, since they will not all lie in the same direction, but charges of opposite sign will be generated on opposite faces when a sudden rupture takes place. If the rock bed fractures with jagged edges, then point discharges will take place, while if fracture takes place at joints, then a floating cloud of luminous particles of dust will be released.

The practical importance of the principle of piezo-electricity in mining lies not so much in the explanation of the luminous clouds or flashes seen when crystalline rocks are ruptured in a stressed state but in the possibility that large-scale explosions in mines with rock roofs of quartzite have been initiated entirely by this natural force. The problem of roof control will assume an enhanced importance, since one main object will be to prevent the sudden dropping of a quartzite roof over an unpacked area. While this procedure can be advocated with a sand roof, there is a possibility of sparking due to impact or friction, and also due to the release of piezo-electricity.

The suggestion may also be made that the stress in a quartzite roof can be measured by the amount of electric charge that is generated inside the bed by pressure. A comparison between results *in situ* and on the testing machine should be simple. This method is more convenient than a direct measurement by a dynamometer, for in the latter, earth pressure minus the resistance of the bed is measured, while by the piezo-electric method the actual stress inside the rock can be measured.

SHAKERS Are Used
At Conveyor Installation
IN THE LOGAN FIELD

An Aerial Tram Brings the Coal Down to the Tipple

CONVEYORS are used in but one mine in the Logan field of West Virginia. This mine, located at Rita, on the main line of the Chesapeake & Ohio about 10 miles up the river from Logan, is operated by the Logan-Chilton Coal Co., a Leckie interest. The conveyors of this installation are of the shaker type.

The equipments consist of two 300-ft. Eickhoff units each powered by a 15-hp. 250-volt "MTA" drive. Wide-mouth scoops made of No. 10 gage, or approximately $\frac{9}{64}$-in., steel have been attached to the face pans. These scoops are not "duckbills," that is they do not advance into the loose coal, but instead ride on ball-bearing cradles, serving not as loaders but only to shorten the distance that the men must shovel from the corners.

Rooms 35x300 ft. are worked with the conveyors. The coal averages 45 in. in thickness. It is comparatively clean and has excellent top. The upper part of the seam is a very soft gas coal which will not stand shipment in lump size, therefore larger lumps or more lump coal is not a consideration in the use of conveyors.

About 12 in. of top is taken down in the entry at the room neck in order to gain height for the conveyor discharge. The entry grades are 2 to 4 per cent in favor of the loads, a condition that makes it possible for the car trimmer to spot the trips, which consist of five cars each. He controls the trip by manila rope wrapped around a snubbing post.

A conveyor crew consists of the car trimmer and five men at the face. One of the workmen is designated as boss of the crew. The six men do the undercutting, drilling, shooting, loading and timbering. The last-mentioned work is light because of the excellent top. Ordinarily the timbering consists of but two rows of safety props. Eight feet is the distance between the props of a row. A mining machine is assigned to each conveyor crew. The cutting is done in the coal and the few inches of coal left at the bottom is not taken up.

The initial installation included a face conveyor of the chain-flight type. Because of mechanical difficulties it was abandoned and the wide-mouth scoop adopted. That shown in the photograph is 7 ft. wide but the one used on the other conveyor is 10 ft. in width. The wider one cuts down the distance that the coal has to be shoveled, but is unwieldy to handle when moving out of rooms where extra timber is required.

Ball-bearing cradles set on the floor are used for all conveyor pans except at the discharge end. A crank-type support attached to timber is used next to the drive, but the weight of the discharge end of the chute is taken by a ball-bearing idler or roller built for belt-conveyor service. The use of this idler is a local idea. It works very well, and as compared to chain hangers it has the advantage that no holes have to be drilled in the roof.

Pans are brought out of a completed room and taken into a working room by using the conveyor trough as a track on which rides a small traveler mounted on four trolley wheels. Dismantling of the trough begins at the face end and is done only as additional pans are needed in the new place. The pan removed is brought out of the room on the trolley wheel traveler, which rides the edges of the trough. It is taken to the face of the new place in the same manner.

Conveyor No. 1 was put into service July 1, 1927. Up to Oct. 16, 1928, it had operated 346 days and had loaded 22,217 tons, an average of 64.3 tons per shift.

Unit No. 2 went into service Dec. 14, 1927, and up to Oct. 16 had operated 215 days and had loaded 12,912 tons. This is an average of 60.1 tons per shift.

These figures are conservative because of the method used in counting up the days worked. No time was taken out for moving, repairing, or for any other reason. The total time given is the number of days the mine worked.

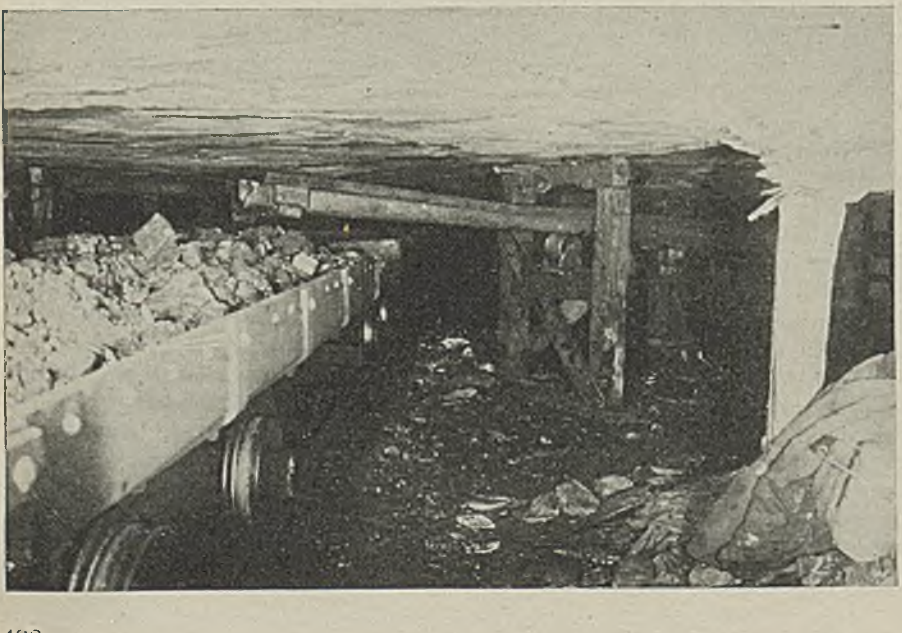
At present the mine production is about 475 tons per day, or 12,000 tons per month. The inside crew for a typical day is 22 loaders and 28 day men. The two conveyor crews are included in the 28 daymen. Haulage equipment consists of 80 drop-bottom cars which were installed when the mine was opened ten years ago.

E. B. Gibson, mine superintendent, believes that the conveyors are making a substantial saving but fully realizes the fact that very close supervision is necessary. "If I had not given the conveyors extra supervision they would have been taken out of service long ago. For instance, I always go in myself and oversee the moving which is necessary about once a month and which is always done during the day shift. I have the mine electrician go in with me. The six men of the crew, the electrician and myself complete the moving in five hours. I stay until I see that everything is lined up properly and working smoothly.

"We are making a small direct labor saving, but the biggest saving is on the haulage. From the conveyor section the gathering locomotive picks up five cars at a time, and gets them on the entry instead of having to go into five rooms. There also is a saving of materials because of concentration. I believe that we could cut our direct cost about 25 per cent if the whole mine were changed to conveyors."

The mine output is handled down a hillside and across the Guyandotte River by a gravity aerial tram over which two buckets operate in balance. The tipple is equipped with screens and picking tables. Four sizes are shipped.

Conveyor Scoop on Cradle in Center of 35-Ft. Room



Loading Into a Five-Car Trip on the Entry

French Have Strict Electrical Laws

French laws relating to the use of electricity in mines have not been changed since the decree of Aug. 13, 1911, according to a report of the U. S. Bureau of Mines in "Safeguarding Electrical Equipment Used in Gassy Mines" (Information Circular 6146). This decree requires that where portable electric lamps are used, a flame safety lamp shall also be provided for each working place. Some French mines are subject to sudden and extremely copious outbursts of gas and the decree forbids the use of electricity in such mines, except for shots and portable electric lamps.

In other gassy mines electrical installations may be made only in intake-air shafts, in the landings of such shafts and in headings which receive air which comes direct from the shaft and has not circulated in any of the working places. Electrical machinery may be installed also in the immediate vicinity of these landings or headings.

Electrical signals and telephones can be used in gassy mines only where daily tests of the atmosphere show percentage of methane to be less than 0.4, but the permanent wiring must be installed in an armored cable, and flexible cables must be protected by flexible conduit; the cables must be placed as close as possible to the floor and protected against breakage and the contact points must be guarded against flashing by 2 in. of oil or more.

Thin Plating of GUNITE *Keeps Entries from Deteriorating*

No Timber Sets Needed on This Wide Roadway, for Gunite Prevents Roof Deterioration

EXPERIENCE in the holding of bad top with gunite in the Nellis mine of the American Rolling Mill Co., in Boone County, West Virginia, has been in general satisfactory but has shown that there are places where it cannot be used with advantage and has indicated what mistakes must be avoided if its application is to be successful.

A thin layer of gunite protects the roof against air and moisture but is not intended to sustain it. Where the roof immediately over the coal is not adequate to support itself and tends to sag it will break the thin layer of gunite and come down. The purpose of the gunite is to prevent the air and moisture from slaking and expanding the roof and so subjecting it to stress of which it otherwise would be free. The layer of concrete protects the roof from deterioration as chrome plating preserves the parts on an automobile.

The Nellis mine is in the No. 2 gas seam. The roof immediately over the coal is of slate. It scales freely during the summer months when moisture is deposited on it and continues the scaling during the winter months at a slower rate. As this slate stratum extends for many feet above the coal without any change in its character it is impracticable to take down the top to a height at which more durable material can be found.

In September, 1926, gunite was first applied in the Nellis mine, using a machine of medium size. A 2-in. application was made for a distance of 270 ft. to an 8x13-ft. air slope which had been driven through rock. Another application, in this instance $\frac{3}{4}$ in. thick, was made to a 6x12-ft. main entry for a distance of 200 ft., beginning at a point 1,500 ft. from the main portal or drift mouth.

After a year the gunite in the slope was holding well and that on the main haulageway was for the most part in excellent condition except where the coating had been hit by the locomotive trolley wheel. More heading was then gunited, bringing the total length so treated on the main return slope to the fan to 640 ft., the length in the double-track heading to 1,350 ft., that in the manway heading to 2,000 ft. and in the single-track main haulway 600 ft. No more work is now being done pending observation of the performance of the completed sections.

About 90 per cent of the gunite in the headings is holding satisfactorily, but in places 50 ft. or more long the coating has fallen from the roof. These failures have been attributed to the use of cement that had deteriorated or of sand that was unsuitable, to the application of too wet a coating, to applying too thick a coat at one time, to pressure on the roof, to the application of the gunite to surfaces too slick and smooth for satisfactory adhesion, to the presence of laminated coal streaks and plant imprints in the roof and to the failure before application to scale down the rotten slate till solid roof was reached.

The sand used should be sharp and clean; the flow of water at the nozzle should be regulated carefully and should be kept to the minimum that will afford adhesion. The final thickness should never be less than $\frac{3}{4}$ in. and the gunite should not be applied in coats in excess of $\frac{3}{8}$ in. each. It is useless to apply the coating where the roof is under stress.

Smooth roof should be roughened with a pick or air hammer before the first coat is applied and under such conditions the preliminary coat should be a thin wash, making a base to which the first $\frac{3}{8}$-in. coat will cling. Where the roof contains laminations of coal and shows signs of vegetation the gunite will not hold. Roof of this kind appears to be intrinsically weak and the gunite will not support it. The roof bends or settles under its own weight and the gunite becomes cracked and falls with the roof.

Proper scaling is of the utmost importance. Before the coating is applied every square foot of the roof should be tested and be found solid. Absolutely no loose rock should be allowed to remain.

One part cement and three parts of sand were found to constitute a satisfactory mixture for the gunite. With this proportion a sack of cement will cover 25 sq.ft. of surface to a thickness of $\frac{3}{4}$ in.

The following costs are based on an average labor rate of 65c. per hour and they apply to a 6x12-ft. heading gunited to a $\frac{3}{4}$-in. thickness. Scaling may cost 10c. or even more per linear foot of heading. The labor cost of the guniting proper is 75 to 85c. per linear foot. A crew of four or five men should cover 1,150 to 1,200 sq.ft. of surface per 8-hr. shift. The total cost of scaling and guniting may be estimated at $1.50 to $2 per linear foot.

Although gunite has failed at many points in the Nellis mine, present indications are that its more general use will be a profitable proposition. Even if only 75 per cent of the top coating holds, the work will be fully justified economically.

Another advantageous use for gunite at the Nellis mine has been in the building of concrete-coated stoppings, with the main wall of slate instead of tile. Walls built of the latter material too often become leaky, for the tiles succumb to roof pressure.

Coal Age

Sydney A. Hale, *Editor*

New York, August, 1929

No Oslerization here

AT A TIME when the question of scrapping the industrial worker of forty is again very much in the forefront of discussion, it is refreshing to record where age is honored and long service is a badge of merit. There are many industrial organizations that refuse to subscribe to the doctrine of advanced Oslerization to placate an illusory efficiency. The railroads, most of which set seventy as the age for retirement, are outstanding examples of the more humane school of thought—and the wiser one. General industry too offers pronounced dissenters to the damnation of middle age.

In the coal industry, one of the most conspicuous advocates of encouragement of faithful service is the Union Pacific Coal Co. Five years ago, under the leadership of Eugene McAuliffe, that company established an Old Timers' Association. Twenty years' service with that company or affiliated organizations is the minimum membership requirement and workers who enter the forty-year class are specially honored at the annual meeting of the association!

No industry that makes a scrap heap of human lives can hope to succeed. This may be the Machine Age, but its greatness will endure only so long as man and not the machine is master. Industries which are extending the span of useful service by the worker and are giving him tangible proof that no artificial limitation will cut short his years of activity are making a real contribution to the promotion of a sound partnership between capital and labor and to the continuation of national prosperity.

Quality will not sell itself

QUALITY MERCHANDISE—whether it be an automobile, a food product or a lowly pin—commands a premium in the American market. There is no reason why quality coal should be an exception to the general rule. Nevertheless, in many cases, coal which has had all the advantages of modern mechanical cleaning has not been lifted out of the price ruck.

How much of this is due to the negative-mindedness of some of the men who mine the coal? Is it any answer to say that overproduction forbids the asking of a premium on a product which has had superior treatment in preparation? Is the too-common statement that the consumer looks upon all coal as merely coal a true reflection of the situation or only an alibi for weak selling?

Quality markets are not created by silence. The consumer's attitude toward a product is tinged by the producer's attitude. Where there is enthusiasm backed by facts it is not difficult to make the consumer dissatisfied with the mediocre and anxious to substitute something better. But the consumer is not philanthropic in his buying outlook; he will not volunteer to pay more for a superior product until the seller shows such confidence in the superiority of his merchandise that he refuses to sink to the cut-price level.

How about the others?

DR. ASHLEY, state geologist, in addressing the summer meeting of the Coal Mining Institute of America described the ruthlessness of nature in destroying the coal deposits of the State of Pennsylvania. The coal was laid down on low-lying ground which at times was even invaded by the sea. Later came uplifting agencies that created a magnificent plateau, which in turn was worn down by erosion, removing millions of foot-acres of coal.

But the deposits of other states, and of the world in general, also suffered heavy losses. Pennsylvania does not stand alone. How about Alabama, which has little but the lower part of the Pottsville Conglomerate measures? Did it lose more than Pennsylvania? Are we to assume that because its lower measures were so thick and so numerous it must have had not only as many feet of coal as the anthracite region but as many as the Ruhr in Germany or as certain fields in Great Britain? Did it ever have the Allegheny or the Monongahela measures?

Because they are not found in Alabama is no sign that they were never there. Similar reasoning can be applied to Tennessee and West Virginia in regard to missing measures. There are certainly many states that had much more coal than they have today. What became of it? Dr. Ashley says it was lost; but still one can only continue to wonder. May not much of the coal float from eroded carboniferous coal have turned to oil in post-carboniferous measures?

It must be remembered that the Pottsville Conglomerate beds, which are thick in the Southern regions, are rarely thick along the littoral of the coal beds in northern Pennsylvania. It seems as if the elevation in the northern tier of Pennsylvania counties during the closing years of the Carboniferous Era was high and coal deposition less than elsewhere, and perhaps in the closing years of that era nil.

So it may be that Pennsylvania did not have as much coal as has been stated and what was taken from her is being brought by pipes and by ships as oil to enter into competition with her today.

Nature's low-temperature distillation plants appear to have been working for centuries.

Alas that geology vexes geologists so often by asking questions they cannot answer! Meantime, Dr. Ashley sets us thinking. He may be right; he would be the last to say that without reservations; but as one member said about his paper and the equally bold spontaneous combustion theory that followed: "If so, what are you going to do about it?"

Let there be light

WHETHER the coal industry is earning a fair return or is one of the shining victims of the era of profitless prosperity is still one of the mysteries of industrial shadowland. Available government data are inadequate and confusing. The published reports of coal-producing companies are too few to furnish a sound basis for general conclusions. Unofficial individual opinion is too colored by contact with individual operations to offer a safe guide; where one observer shouts disaster, another whispers profits.

For these reasons the decision of the National Coal Association to make a broad survey of results by half-year periods since July 1, 1927, is one to be applauded. Whatever the real facts in the situation the industry and the public will benefit by their publication. If they prove to be as bad as some seem to think, the shock of their revelation ought to stir the industry to the quick application of remedial measures. If, as others believe, the picture will confound the mourners' bench, that knowledge should restore a sense of self-respect to an industry which has been crying poverty so loudly that the rest of the world has treated it with more contempt than sympathy.

Coal and chemical tariffs

ECHOES of tariff campaigns have fallen lightly on the ears of the bituminous coal industry in late years. Except as any decline in manufacturing in this country attributable to heavier imports of foreign merchandise meant a possible decrease in industrial coal consumption at home, this perennial political-economic dispute has not disturbed the coal producer. This year, however, interest has been sharpened. The National Coal Association has appeared in support of a protective tariff on oil. The interest here needs no exposition to make it understandable. But the situation in still another industry also has a valid claim upon the consideration of the coal man. That industry is the chemical industry.

The growing importance of coal as a raw material for the chemical industry is well known. On the more familiar processing side there is an annual consumption of coal in byproduct coking now climbing toward 70,000,000 tons. Recent technical developments in the manufacture of synthetic ammonia and certain alcohols are making the bond still closer. Each ton of synthetic ammonia made in this country means the consumption of at least four tons of coal. During the present year it is estimated that this particular branch of the chemical industry will absorb nearly 500,000 tons of coal.

Compared with the total bituminous coal output this is not a large segment. But the possibilities for expansion in this field become impressive when it is set down that the imports of all forms of inorganic nitrogen last year, if produced in this country, would have created a market for 1,200,000 tons. Those in a position to judge estimate that, if the domestic synthetic nitrogen industry is accorded proper protection, it will soon be producing 2,000 tons of ammonia per day.

Moreover, this industry is developing related lines of manufacture, including alcohols, solvents and motor fuels by the hydrogenation process. A reasonable expansion of the American synthetic chemicals field would make an annual consumption of 5,000,000 tons of coal within a few years highly probable. With such an outlook the stake of the coal industry in tariff legislation on nitrogen products is a vital one.

Breakage or decay?

MUCH of the loss of mine timber that is charged to breakage rightly should be ascribed to decay. A fungus spore does not get in its deadly work unless and until it manages to secrete itself in a check in the wood, or in a crevice between two pieces. Once there it multiplies abundantly, converting the cellulose into carbon dioxide and water with hydrocarbons which are suitable for its food supply. Thus it predigests its food outside of itself and then, after it has thus predigested it, takes a small part for its own nourishment. This digestion proceeds rapidly until the whole stick is involved. When the part of the stick affected shows signs of becoming exhausted, the mycelium enters the flowering stage. It develops a fruiting body on the outside of the timber and eventually discharges a myriad of spores into the air, any one of which may infect another piece of timber.

The exterior stage is the last of all the stages; the timber is rotten before it occurs and is weakened long before the interior rot is completed. When a timber fails that has been subjected to the same stress from the time of installation till the hour of failure, it cannot be said to have collapsed from breakage, for the fracture would never have occurred had not preliminary rot developed. Failure to realize that timber may be rotten that appears whole has caused many a false diagnosis and faulty prescription. It is essential to differentiate between the effects of stress and decay.

The BOSSES

Training Men for the Machine Age

"WHAT'S eating you this evening, Jim?" asked Mac. "You look as if you have worked your way into a trance."

"Only this," replied Jim, as he turned on his swivel chair to acknowledge the foreman's entrance into his office, "the Old Man is threatening to install loaders and conveyors, and I believe he will do it."

"Well, what of it?"

"I want them, all right," mused Jim. "You know I've been hankering for some time to give some device of this kind a twirl. But hang it, Mac, the things won't run themselves. Some operating men have thought so, much to their sorrow."

Mac read the super's thoughts. "Thinking of men, Jim?"

"That's my big worry right now. We'll need men mechanically bent, who have certain other qualifications, to run the machines and for other jobs, too. We know our men; we know you can't make a good runner or helper out of any man merely by putting him through a course of training. Our problem will be how to find the right man and then how to train him."

HOW DO YOU DO IT?

1. *How do you spot likely candidates?*
2. *What qualifications must they have?*
3. *What promises do you hold out to them, if any?*
4. *What are your methods of training?*

All superintendents, foremen, electrical and mechanical men are ur

Talk It Over

Men Wanted

At the suggestion of the operating vice-president of a company using many loading machines these pages have been made available for the discussion of mechanization problems as well as those in other branches of mining. The machines have been developed and perfected to such a point of reliability that at this time the big problem involves men for their operation. The first discussions of mechanization problems in these pages are scheduled for the September issue. Study the problem on the opposite page and send in your answer.

Hints on Making Electrical Equipment Safe for Mines

Law of Probability Is Heavy

THE first cost of making safe electrical installations is high but in the end the upkeep is comparatively small and the hazards of operation are greatly reduced. As a foundation for safe installation all electrical material should be of approved make and securely installed. To obtain best results an inspector reporting to the highest operating official should be employed.

In everything we do there is a probability of failure; it is high or low depending on whether recognized practices or slipshod methods are followed. As an example, consider the probability in attempting to hang energized trolley wire, a fool practice which is sometimes followed. In a certain large mine the inspector condemned the practice, but the company made little effort to comply with his recommendations until one of the workmen was killed while attempting to stretch a "hot" wire while standing in a steel mine car. Investigation showed that this company had killed three men in twelve years doing the same thing. They don't hang "hot" wires there any more.

Another example of the law of probability is that of a mine boss who always had said that trolley wire at crossings could not be kept guarded. One evening his own son was carrying a short piece of pipe when he crossed under a trolley wire. The pipe, resting against his neck, made contact with the wire and instant death followed. All trolley wire at crossings is now guarded at this mine.

The old law of probability can't be beaten. And when a man once awakens to a certain hazard it is remarkable the things he can do to eliminate it.

Good practice requires that hangers be placed a specific distance apart on a straight line at a standard distance outside the rail. Trolley frogs work best when placed at one particular point and no other point will do. Sectional insulators should be installed at every branch entry and should be set in around the curve so as not to interfere with trolley-wire guards.

I like heavy rubber hose (not common fire hose) for guarding trolley wire. It should be supported by hangers on 4-ft. centers around curves and 5-ft. centers on the straight. It should reach from the frog to the inby point of the rib. This installation is not cheap but it lasts and needs practically no upkeep. There is only one way to guard a trolley line, whether boards or hose be used, and that is to do the job right.

Safety depends entirely on a man's point of view. If he likes it he can find much to do to promote it; if he doesn't he can find much to say against it.

GEORGE EDWARDS.

Paintsville, Ky.

To Avoid Electric Shocks

THE Old Man's experience is a fair example of what can happen at any mine where live wires are not properly protected. The best way to prevent such shocks is to have the circuits installed by trained and experienced men under the supervision of an official who has a thorough knowledge of electrical installation in mines.

Unprotected trolley wires are not the only cause of electric shocks and fatalities in mines. Sometimes negligence of men carrying tools or other metal objects along the haulways or in the rooms where machine wires are strung also contributes to such accidents. Workmen should constantly be on the alert against the danger of tools touching the wires. Machine runners often receive shocks while attaching clips to power lines and returns. Machine frames, if not properly grounded, and poor returns are a cause of shocks.

There are many ways in which workmen may come in contact with electricity and there are many ways to avoid the hazard. From my own experience, I believe that where the bed being mined is thin and the roof good a channel cut in the roof, to a depth that will allow the wire to be hidden within it without touching the roof, is superior to any other means of guarding wires at crossings. It is a permanent arrangement and needs no maintenance.

For mines in low seams not having sound roof the use of some kind of flexible guard should be considered. Old belting attached to the roof makes a good guard for low seams. For thick seams there are a number of devices on the market for holding guard boards. There is only one way to install wire through doors and stoppings and that is to provide such clearance that the copper will not touch the materials from which these structures are built. The proper location and installation of switches for isolating sections depends on conditions encountered.

Ample clearance along haulways as well as ample guarding will do much to eliminate shocks in coal mining. The substitution of storage-battery locomotives for units of the trolley type would practically eliminate deaths from this cause.

C. T. GRIMM.

Adrian, W. Va.

Mac Was Lucky

IT SURE was lucky for Mac that it was the Old Man and not a coal loader, wet with perspiration and carrying a load of tools, who hit the unguarded trolley wire or he might have had a fatal accident on his hands. The guard for this crossing should have been put up before the power was turned on the wire, for no wiring job is completed until it is properly insulated, guarded and generally made safe. It doesn't take long to install a trolley guard and the saving in the cost of accidents

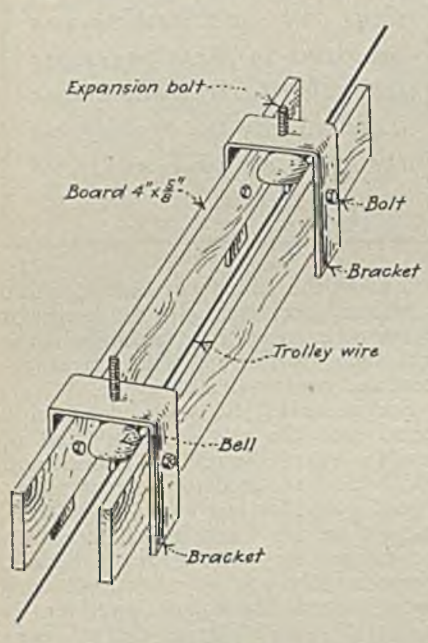
to discuss the questions. Acceptable letters will be paid for caused by unguarded wire is many times what is saved by omitting this safety feature. The guard should extend across the entire width of a crossing and along the entire length of a switch.

Plugs and sockets should be placed where there is plenty of room and where it is dry. A light should always be installed near them in order that a man may see what he is doing in making connections. It is also well to keep a dry insulated board handy to these connectors. WALTER HORNSBY.

Stickney, W. Va.

A Trolley Guard Suggestion

I AM submitting here a sketch of a trolley guard that may help Jim and Mac to satisfy the Old Man. It is the usual board type but it is hung from brackets made of bar iron ½ in. thick and 1½ in. wide. The brackets are shaped



Designed to Stay Put

into a square U through the middle of which is drilled a hole for an expansion bolt that holds it in place. The boards used need be no bigger than 4 in. wide and ⅝ in. thick.

Greenville, Ky. G. D. B.

Take Out the Doors

IN ORDER to keep trolley wire clear of a door a hanger should be placed on each side of the headframe and a slot cut in the door itself. But I don't think doors should be tolerated in a coal mine. If a cost sheet were kept of the delays and expense of stopping trips to open and close doors and maintaining them, overcasts would be substituted for many of the doors now in use.

Trolley or other wires should not be put through a brattice cloth. If and when it is found imperative to do so, a short piece of rubber hose should be installed around that portion of the wire likely to make contact with the cloth. I prefer the rubber guards to board guards for the reason that a man is likely to hurt his head on a board guard and not on the rubber guard.

All connections should be made with a wire splicer of the sleeve and screw type and in flexible wire they should be soldered. For lighting purpoes nothing but approved sockets should be used and all lighting wire should be hung from insulators. The cutout switch at the entrance to each section should be provided with a well insulated handle and a locking arrangement for the open position.

Capels, W. Va. C. E. LIVELY.

Electricity Can Be Made Safe By Guarding Mine Equipment

WHERE bare wires or trolley lines are within 6 ft. of the ground some form of guard should be put up, and in all cases a sign should plainly indicate their position. An effective guard for this purpose can be made by fastening two narrow boards on either side of the wire about 4 in. from it. Use of these boards will still leave the wire in view for inspection and repairs.

Open sockets, etc., should be interlocked so that when the plug is withdrawn a cover entirely incloses the live

Recent Patents

Rock Drill; 1,718,734. Howard R. Drullard, Salt Lake City, Utah, assignor to Gardner-Denver Co., Quincy, Ill. June 25, 1929. Filed May 10, 1921; serial No. 468,234.

Jigging Conveyor; 1,718,941. Gustav Bockau, Ottumwa, Iowa, to Ottumwa Iron Works, Ottumwa, Iowa. July 2, 1929. Filed March 22, 1928; serial No. 263,631.

Adapter for Detonating Fuses or Instantaneous Matches; 1,719,065. Richard Mallet, Paris, France, assignor to Ensign Bickford Co., Simsbury, Conn. July 2, 1929. Filed Sept. 21, 1928; serial No. 307,524.

Coal Conveyor; 1,719,448. William Poxon, Clowne, England. July 2, 1929. Filed Aug. 28, 1928; serial No. 302,529.

Coal Screen; 1,719,513. Frederick A. Krehbiel, Hinsdale, Ill. July 2, 1929. Filed Feb. 24, 1925; serial No. 11,588.

Mining Bucket; 1,719,576. Grover C. Voit, Hopedale, Ohio. July 2, 1929. Filed Sept. 18, 1928; serial No. 306,624.

Safety Hoist Mechanism for Loading Skips; 1,720,048. E. H. Lichtenberg, Milwaukee, Wis., assignor to the Koehring Co., Milwaukee, Wis. July 9, 1929. Filed Feb. 10, 1923; serial No. 618,369.

Check Lock for Mine Cars; 1,720,164. Matija Beshenich, Mollenour, Pa. July 9, 1929. Filed March 14, 1928; serial No. 261,570.

Leveler Bar for Coke Ovens; 1,720,805. Joseph Van Ackeren, Pittsburgh, Pa., and John I. Thompson, Ben Avon, Pa., assignors to The Koppers Co., Pittsburgh, Pa. July 16, 1929. Filed April 15, 1927; serial No. 184,052.

Brake Mechanism for Mining Cars; 1,720,954. E. N. Goins, Monongah, W. Va. July 16, 1929. Filed June 1, 1927; serial No. 195,697.

Drag Scraper; 1,721,479. Robert H. Beaumont, Radnor, Pa., assignor to R. H. Beaumont Co., Philadelphia, Pa. July 16, 1929. Filed Dec. 9, 1926; serial No. 153,532.

Classification System for Pulverized Materials; 1,721,594. Harlowe Hardinge, York, Pa., assignor to the Hardinge Co., Inc., York, Pa. July 23, 1929. Original application filed Aug. 28, 1925; serial No. 53,174. Dividend and this application filed Dec. 31, 1927; serial No. 243,824.

Rope-Thrusting Shovel; 1,721,761. Joseph J. Arnaud, South Milwaukee, Wis., assignor to Bucyrus-Erie Co., South Milwaukee, Wis. July 23, 1929. Filed May 28, 1926; serial No. 112,206.

Vibratory Screen; 1,821,802. Clarence K. Baldwin, Scarsdale, N. Y., and Samuel D. Robins, Woodmere, N. Y., assignors to Robins Conveying Belt Co., New York City. July 23, 1929. Filed July 29, 1926; serial No. 125,718.

Hoist; 1,722,235. Clyde Ross, Chicago, assignor to Roberts & Schaefer Co., Chicago. July 23, 1929. Filed Sept. 23, 1926; serial No. 137,269.

Benzine Safety Lamp for Indicating Firedamp; 1,716,374. Hans Fleissner, Leoben, Austria. June 11, 1929. Filed Aug. 31, 1926; serial No. 132,814.

Coal Sizing and Impurity Separating Device; 1,716,486. William F. Davis, Belleville, Ill. June 11, 1929. Filed July 19, 1926; serial No. 123,412.

Endless Conveyer; 1,716,633. Henry D. Hamper, Aurora, Ill., assignor to Western Wheeled Scraper Co., Aurora, Ill. June 11, 1929. Filed May 28, 1924; serial No. 716,427.

Cap; 1,716,719. Ralph E. Christopher, Grindstone, Pa. June 11, 1929. Filed July 9, 1926; serial No. 121,393.

Method of Burning Fuel; 1,716,815. Thomas M. Chance, Merion, Pa. June 11, 1929. Filed Feb. 1, 1927; serial No. 165,248.

System for Cooling Mines and Other Chambers Requiring Ventilation; 1,717,005. W. H. Carrier, Essex Falls, N. J., assignor to Carrier Engineering Corporation, Newark, N. J. June 11, 1929. Filed Feb. 25, 1924; serial No. 695,045.

Rotary Car-Dumping Apparatus; 1,717,124. Frank E. Smith, Scottdale, Pa. June 11, 1929. Filed Oct. 3, 1927; serial No. 223,671.

Boot for Use by Miners; 1,717,127. John Toole, Kirkland Lake, Ontario, Canada. June 11, 1929. Filed Nov. 28, 1927; serial No. 236,332.

Vibrating Screens; 1,717,498. Emil Deister, Fort Wayne, Ind. June 18, 1929. Filed Sept. 30, 1926; serial No. 138,501. Renewed April 29, 1929.

Hub for Mine-Car Wheels; 1,718,045. W. D. Hockensmith, Irwin, Pa., assignor to Hockensmith Wheel & Mine Car Co., Penn., Pa. June 18, 1929. Filed Feb. 9, 1928; serial No. 253,030.

Automatic Skip Loader; 1,710,794. Charles M. Young, Jr., assignor to Link-Belt Co., Chicago. April 30, 1929. Filed July 10, 1926; serial No. 121,504.

Screen; 1,710,795. Ray W. Arms, Chicago, assignor to Roberts & Schaefer Co., Chicago, April 30, 1929. Filed Jan. 14, 1928; serial No. 246,719.

Conveyor; 1,710,883. Lee Llewellyn and Carl L. Kenney, Dormont, Pa., assignors to Pittsburgh Coal Washer Co., Pittsburgh, Pa. April 30, 1929. Filed Aug. 25, 1926; serial No. 131,440.

Air-Operated Feeder for Shaker Conveyors; 1,711,966. Gomar Reese, Kemmerer, Wyo., assignor to Link-Belt Co., Chicago. May 7, 1929. Filed Nov. 8, 1926; serial No. 146,983. Renewed July 5, 1928.

Adjustable Support for Loading Skips; 1,712,447. Charles F. Ball, Milwaukee, Wis., assignor to Chain Belt Co., Milwaukee, Wis. May 7, 1929. Filed May 31, 1927; serial No. 195,301.

Spiral Runway; 1,712,714. Frank Pardee, Hazleton, Pa., assignor to Anthracite Separator Co., Hazleton, Pa. May 14, 1929. Filed Aug. 31, 1927; serial No. 216,526.

Lowering Chute; 1,712,715. Frank Pardee, Hazleton, Pa., assignor to Anthracite Separator Co., Hazleton, Pa. May 14, 1929. Filed June 6, 1928; serial No. 283,212.

Vibrating Screen; 1,713,143. G. A. Overstrom, Pasadena, Calif. May 14, 1929. Filed Aug. 31, 1927; serial No. 216,525.

Miner's Battery Holder; 1,713,413. Lawrence T. Yenerall, Jefferson, Pa. May 14, 1929. Filed March 30, 1928; serial No. 266,032.

Rock Drill; 1,709,024. August H. Katterjohn, Denver, Colo., assignor by mesne assignments to Gardner-Denver Co., Quincy, Ill. April 16, 1929. Filed Dec. 24, 1923; serial No. 682,513.

Loading Apparatus; 1,709,082. Nils D. Levin, Columbus, Ohio, assignor to Jeffrey Mfg. Co., Columbus, Ohio. April 16, 1929. Original application filed Aug. 1, 1913; serial No. 782,522. Divided and this application filed Feb. 28, 1919; serial No. 279,729. Renewed May 4, 1926.

Process of Working Down the Products Arising When Coal Is Liquefied by Hydrogenation; 1,709,957. Karl Schoenemann, Mannheim-Rheinan, Germany. April 23, 1926. Filed Dec. 1, 1926; serial No. 152,067.

contacts. The best safeguard, however, is the use of substantial plugs which have been designed and approved as satisfactory for mine service. An insulated guard should be provided for each socket.

Fires caused by electricity are best prevented by carefully installing the electrical conductors. Cables should never be passed behind timbers or between timbers and the roof or allowed to come in contact with coal, stone, etc., having sharp edges. Good clearance should be provided for all bare wires which pass in the vicinity of any ignitable material. Conductors also should be guarded where there is any possibility of any other objects coming in contact with them and causing arcing.

Switches always should be fixed so that any part of the mine may be isolated for repairs or construction work. It is a good policy to divide the mine into sections and have each section controlled by a switch so that any electrical trouble can be immediately localized. Oil switches in cast- or wrought-iron tanks are advisable for mine work as there is less danger from gas or coal dust. Where ordinary inclosed switch gear is used care should be taken that the switch chamber is not in direct communication with the atmosphere because of the omission of some of the corner bolts.

W. E. Warner.
Brentford, England.

Here Is System

Regular inspections of the electrical distribution system must be made. In addition to those made by our own men, inspections are conducted every 60 days by an independent electrical engineering company. The reports of this company are valuable to us, as they make recommendations for the saving of power and provide a check on the reports of our own men.

Arc-weld bonds are installed on all track to the end of the trolley wire and crossbonds are placed every 200 ft. All track switches are bonded around and bonds are tied to pipe lines every 500 ft., where possible. This insures a good return in case bond terminals work loose between inspections. We see that all track splices are kept bolted tight. Trolley wire is suspended by bulldog hangers spaced at 20-ft. intervals except on curves. Sectional switches are placed at the mouth of every entry. Splices in the main trolley line are kept to a minimum by the practice of taking down old wire and putting up a full length of new wire, using the old wire for extensions. Feeder wires are suspended in the same manner as the trolley lines and are connected by soldered joints to the end of the trolley line. All lines are continually inspected to eliminate grounds.

C. A. Peake, Supt.,
Kermit, W. Va. Earlston Coal Co.

System in Ordering Supplies Will Lighten Workers' Burden

Unless supplies are ordered in a systematic way it is practically impossible to insure that they will reach the place where they are required in time. All orders for supplies should go through the hands of the mine foreman and should be entered in a book kept for the purpose. At the end of the day the mine foreman's book should be handed to the yard foreman, who arranges for the delivery of supplies the following day. The yard foreman makes an entry in a book he has, which is a duplicate of the entry in the book of the mine foreman. The mine foreman can easily anticipate his requirements at least a day ahead. He will be able to keep a better check on his supplies if the material not delivered is marked and a reason given in the books.

Co-operation between the day and the night crews will tend to alleviate a great deal of unnecessary work. A report of delivery should be submitted so that the officials may know if the supplies have been sent to all places needing them. Often men are sent to work on a particular job thinking the supplies have been delivered when they have not, with the result that much valuable time is lost waiting or searching for the material. Instructions to the crews should be explicit and definite.

Mac is right when he suggests another boss. He is a poor boss who cannot earn his pay by the greater efficiency and safety and reduce waste of material consequent on keener supervision. There is no need of a boss riding his men because if he knows his work he will know if a reasonable day's work has been done between his visits.

William J. Davies.
Edwardsville, Pa.

Foreman Learns From Mistakes How to Avoid Them in Future

First among the necessary qualifications of a good mine manager or foreman must be placed character, without which he cannot command the respect, co-operation or confidence of his employees, assistants or the company he represents. In addition to those qualifications exacted by the State Department of Mines, he must possess a well-matured mind, though he need not be of an age much greater than required by law.

He must show executive ability; have broad experience in mining and safety measures relating to the same, as well as a knowledge of human nature or, as we sometimes call it, psychology. Even a good foreman will make mistakes, but the desirable man is one who limits the extent and number of errors, profiting by the increased knowledge derived from experience. The mining company that pays for this education will frequently regard the expense as other investments of today—the returns will appear in the future.

The foreman in a majority of mines finds himself working with the aid and assistance of superintendents, efficiency, safety and mining engineers having various degrees of authority. A maximum benefit to the company will be realized only when the foreman extends full co-operation to these various departments.

To improve himself to better discharge his job I would recommend the regular reading of the mining journals, a membership in his state mining institute or society and attendance at the meetings when possible. And lastly, though foremost in importance, comes study; the study of books is very well, though I refer to a study of himself, his conduct, his successes and his failures, and to pick therefrom the desirable qualities while concentrating upon the correction of his defects. It is a good foreman who can handle this personnel problem in the same manner he should one in regard to haulage, increased lump, safety or ventilation.

A foreman, like others, can be known by the company he keeps, which applies to his entire force though particularly to his assistants. Few of us could accomplish anything of note by ourselves. It is a good foreman who builds up an organization composed of the highest grade men available, without regard to personal friendship or family relationship. He is then in a position to accomplish a maximum amount himself toward the safety of his men and the satisfaction of his employer.

J. W. MacDonald.
Christopher, Ill.

Publications Received

Falls of Roof in Bituminous Coal Mines: Influence of the Seasons and Rate of Production, by J. W. Paul. Bureau of Mines, Washington, D. C. Technical paper 410; 40 pp.; illustrated. Price, 10c.

Engineering Experiment Station Record—A Summary of Engineering Research at the Land-Grant Colleges and Universities; 98 pp. Price, $1. Engineering Experiment Station Committee of the Association of Land-Grant Colleges and Universities, Manhattan, Kan.

Sampling Dust in Rock-Dusted Mines, by C. W. Oeings. Bureau of Mines, Washington, D. C. Information Circular 6,129; 8 pp.

The Effect of Substituting Ethylene Glycol Dinitrate in Permissible Explosives, by G. St. J. Perrott and J. E. Tiffany. Bureau of Mines, Washington, D. C. Reports of Investigations, Serial 2,935; 5 pp.

Advanced Mine-Rescue Training—Part III, Protection Against Gases Encountered in Mines, by J. J. Forbes and G. W. Grove. Bureau of Mines, Washington, D. C. Miners' Circular 35; 53 pp., illustrated. Price, 15c. Discusses the erection of barricades during mine fires or following mine explosions, the construction of refuge chambers, the carbon-monoxide self-rescuer, gas masks, oxygen breathing apparatus and resuscitation.

Coke-Oven Accidents in the United States During the Calendar Year 1927, by W. W. Adams. Bureau of Mines, Washington, D. C. Technical Paper 443; 40 pp., tables. Price, 10c.

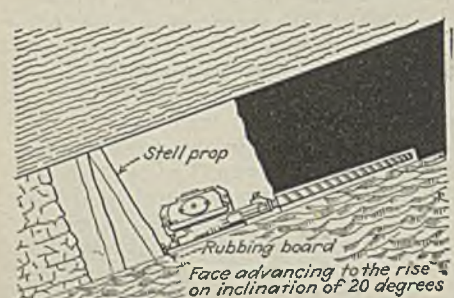
NOTES

From Across the Sea

SO many coal areas in the United States are level or nearly level that the technique of cutting by machines on steep or even on moderate pitches has been but little developed. Nevertheless there are many coal fields in this country that have steep pitches—the anthracite region on one side of the continent and the Washington State bituminous coal fields on the other, with some coal in Alabama, Colorado and Idaho also. There also is some steep-pitching coal in Illinois but it is not being worked.

Much of the heavily tilted coal is not machine-cut, but the advantage of machine cutting is much under discussion and consequently European practice may well be considered—rather by example than exhaustively, however, for the subject would take more space than can be allotted to it.

But, first of all, cutting on moderate slopes under 20 deg. or approximately one foot in three may be considered, and in order to avoid misapprehension it will be well to speak first of advancing to rise or dip by cutting in a direction parallel to the strike, though that is not usually the preferable way of working. To make what follows entirely clear let it be understood that the machine is traveling in the direction of a level line and the cutting member of the machine is pointed upward or downward according to the direction in which the face is advancing. It is necessary to get this clearly in mind, for when the machine is traveling on the level, the face is being advanced to the dip or rise and any statement as to "advance to rise or dip" may be ascribed to the machine and to the cut



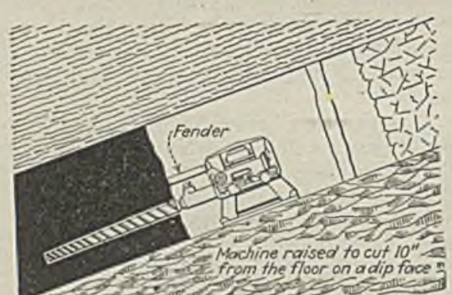
Advancing Up the Pitch

whereas as it should refer always to the face of the working.

The steeper the slope the greater the difficulty that is experienced in working the coal that way. The purchase of the machine on the floor is reduced by this method of working if the pitch or dip is acute. Thus it is difficult to control the position of the cut. The lubrication is not so simple and effective when the machine is working in this manner nor is the wear so uniform.

Where the advance is toward the rise the machine must be kept in place by "stell" props especially set for that purpose. That is a heavy labor item, but these props cannot well be omitted, for without them the machine will not keep its position in the cut but will come part of the way out of it and leave a crooked face. With a strong coal, advancing uphill may be reasonably safe. But the coal, if not strong or if subject to crush, may fall forward, particularly if it is thick and there are partings to which the coal is not adherent or, as it is commonly expressed, "burned." Where the slips are well marked the danger is the more increased.

It is in rise faces that many accidents occur. Probably it is only the hardness of the anthracite beds in this country that makes the accident rate



Advancing Down the Pitch With Cut Above Bottom

from face coal only about 26 per cent of the accidents from falls at the face.

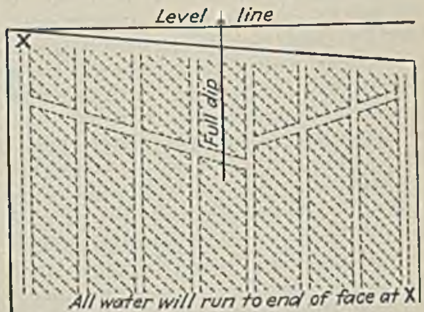
But how about faces advancing to the dip, still with the machine traveling along the strike? Here there is much less risk from falling coal but the machine tends to slide into the face and that is likely to make the cutter jam. The machine may catch against projecting coal, and thus the rope or chain which moves the machine forward may be broken. No stell post can be placed to hold the machine from the face, but a face fender may be provided, as shown in the illustration, and it will be of assistance against such jamming or breaking.

Another difficulty is that the cuttings have to be brought uphill and, if shoveling is neglected, the cutting member will jam, the cuttings will be churned to dust and the power used will be excessive. Chain and disk machines will take some of the coal back under the cut and bar machines will leave some in.

Water, which leaves the face when driven to the rise, gives much trouble in working to the dip, making the operation of the machine a difficult and troublesome task, especially where, as often happens in Europe, the bottom is soft and tends to heave.

Where the coal can be readily scrapped from the bottom it is best to cut at an elevation of 8 to 12 in. above the floor. Then the cuttings will fall free at the face and cannot be carried back to jam the bits. Nor will the water run to the back of the cut, carrying the cuttings with it. Less coal has to be shoveled and if pumping is necessary the water, being backed against the face, can be removed more readily.

In working to the dip the face should



Turn Face Off Strike When Advancing Down Dip

not be directly on the strike but on such an inclination that the water will run to one end of the face where it can readily be pumped.

In choosing which end of the face shall be in advance of the other, consideration should be given to the line of fracture of the roof so as to protect the working from roof falls. This applies to working to the pitch also. Where the conditions are favorable, machines are being worked successfully at a pitch of 20 deg. But if the floor is flaky and soft the stell props will not hold. Putting rubbing boards with steel runners against the machine will aid in holding it in place. Of course, where the gradient is irregular there is difficulty in such work.

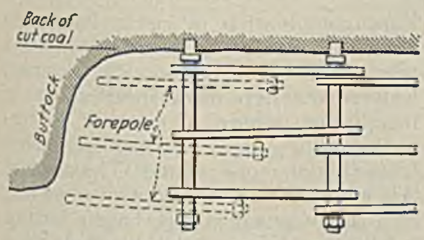
For this discussion of working a seam advancing up or down the pitch I am indebted to *M&C Machine Mining*. The question of what can be done where the advance is parallel to the strike, where the cutting member is on the level and the movement of the machine is straight up the pitch or down the dip, is left for a future issue. As has been stated, this is the more usual way in Europe of working inclined coal unless its pitch is extremely moderate. In America we tend always to advance of our faces to the rise. It is the custom in Europe where the coal is cut by machine to advance in the direction of the strike, though it proves to be almost impracticable to work the *machine* up the inclination when the slope exceeds 80 to 85 deg.

R Dawson Hall

On the ENGINEER'S BOOK SHELF

The Support of Underground Workings in the Coalfields of the South Midlands and the South of England, by The-Support-of-Workings-in-Mines Committee; Safety in Mines Research Board, Paper No. 45; 86 pp.. 26 plates 6½x9⅝ in. Price, 4c.

Reading this book the coal man will note how many are the provisions for safety that are adopted in these fields and yet are almost unknown in this country. Unfortunately, one cannot make a true comparison between the conditions in our fields and in theirs. Evidently there are hazards which make such precautions peculiarly neces-



Forepoles Approaching Irregular Buttock on Machine-Cut Face

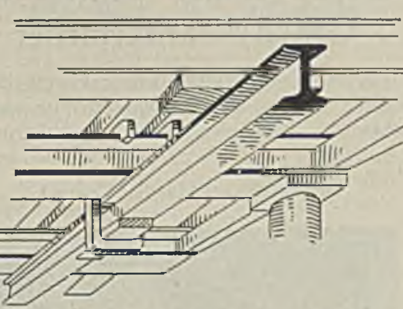
sary in England and perhaps not all of them are needed here in such mines as are being operated. The accidents described in the bulletin, however, show that carelessness is not a characteristic peculiar to the American miner, and that in British mines, as everywhere, where the roof apparently is good the miner takes undue chances with it.

The report advocates that "sprags," or short inclined posts, be set between the floor and the bottom of the front of all undercuts and says they should always be sunk in the floor, though the need is greatest in a face being advanced to the rise. On the one hand it recommends that "timps," or small foot pieces, be used under posts where the floor is soft and that when the floor is hard and the roof sags the posts be tapered, and adds that the round taper is superior to that which is chisel-shaped. Props, says the report, should be dry when sent into the mine because dry props are stronger than wet ones, but steel props that are self-adjusting are strongly recommended for economy and safety.

The report recommends the general use of wood bars, or long caps, at the coal face and that under friable roofs forepoles be used. From a drawing in the bulletin the kind of forepole appears to be a bar extending toward the face from the nearest prop row, resting on a crossbar at the center and held up to its work at the face end by the leverage of a cap piece wedged against the roof at the other end of the bar. This can be moved up as the coal at the face is brought down by a pick; "rated off" as the expression goes. Bars with the front end set into the coal are common and should be used, says the report, to support the roof on all machine-cut faces.

The committee advocates that the back timber be removed as early as possible because the nearer it is to the face the less it will be broken and the safer it will be to draw it. If the roof does not fall immediately when the timber is withdrawn, temporary chocks or breaking-off props should be set.

One mine in North Staffordshire has about 12 miles of roadway supported by steel arches and 1,000 tons of arch

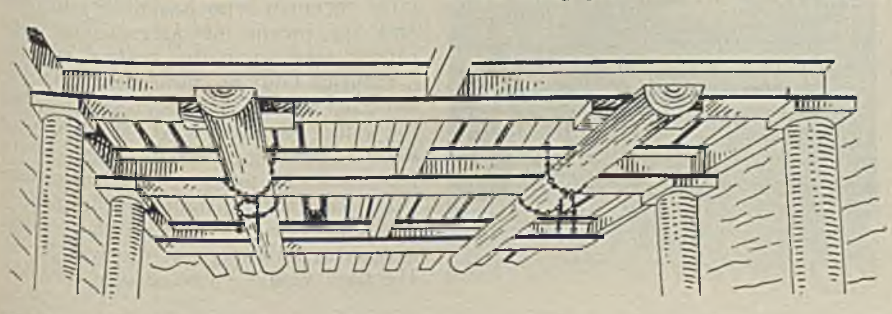


"Horsehead" With Girder and Clip

material is used yearly at this plant; in some of the seams arches are being set right up to the coal face. When once steel arches are tried their use is generally extended, says the committee.

A "horsehead" or "safety girder" is a heavy stick chained tightly to the lower side of two sequent crossbars, one end of the stick extending over work being performed; thus protecting the worker. A steel girder may be used attached to the crossbars by clamps. It is a sort of hanging forepole. This is recommended by the committee for use when enlarging roadways, especially in flat measures. Another piece of advice is that a census of tools be taken periodically to insure that all workmen are well equipped.

"Horsehead" With Wood Bar and Chains



* * *

Methods, Costs and Safety in Stripping and Mining Coal, Copper Ore, Iron Ore, Bauxite and Pebble Phosphate, by F. E. Cash and M. W. von Bernewitz; U. S. Bureau of Mines Bulletin 298, 275 pp., 5¾ x 9⅛ in. Price 70c.

Though incomplete in its tabulations of strippings and behind date as to some developments in practice, this report on stripping will be found valuable, for stripping areas are so widely separated that few strip-pit operators know much about stripping practice as a whole. In fact coal men probably would fail if asked to mention bauxite and pebble phosphate as stripped materials. Few know anything of hydraulic stripping, yet that is the means usually adopted for uncovering pebble phosphate with a cover of 2 to 20 ft.

That the hydraulic method of stripping sometimes has possibilities is shown by its use at the Wyodak mine, according to the statement of the assistant general manager of the Homestake Mining Co., of which the Wyodak Coal & Mfg. Co. is a subsidiary. The cost of stripping during 1927 was 15½c. per cubic yard. This is considered high, but the high cost is due to a rubbery fireclay which takes most of the sluicing time. The cost of loading coal into the conveyor is about 2c. per ton, exclusive of blasting. The coal, says the report, is 79 ft. in thickness. Lest too many invade the pleasant little town of Gillette and tear up its acres of marginal farm land it may be well to say that the coal is sub-bituminous and the markets rather remote.

Those who have feared that the strip pit dooms large acres to sterility will be glad to learn from the bulletin that "in the fall of 1910 one company planted 1,490 peach trees, 1,951 apple trees and 990 pear trees, a total of 4,431 trees, on spoil banks at an abandoned strip mine in Clay County [Indiana]. All of these trees fruited, and their growth has been remarkable; in fact they are progressing much more rapidly than trees planted in natural soil. Thousands of bushels of fruit are gathered each year from this orchard. The Sherwood Coal Co. and the Central Indiana Coal Co. are experimenting with several varieties of trees."

The authors point out that stripping is producing minerals of low market value. Bauxite is worth \$6.15; anthracite averages \$5.60; iron, \$4.06; copper, \$2.50 to \$3.93; pebble phosphate, \$2.68; bituminous coal, \$2.20. All these are for net tons. Were the materials more valuable stripping could be extended to far greater depths.

OPERATING IDEAS *from* Production, Electrical *and* Mechanical Men

Bad Roof Condition in Mine Corrected By Half Header

IT WOULD pay all companies having a high timber cost to ask themselves the question, "Are we using the right system of timbering?" So writes Walter Hornsby, assistant foreman, Glo Gora Coal Co., Stickney, W. Va. A great saving in labor and material could be made in many mines merely by a change in the method of timbering and at the same time a greater degree of safety could be maintained. An example of great saving and how it was accomplished is cited in what follows:

A certain mine had been using 6 x 6-in. sawed oak headers, 9 ft. long, in all working places over a period of about twelve years. From the drift mouth to the face of all places the roof was literally covered with these costly timbers. The top was fairly good, but gas would make it draw to a thickness of about 6 ft. on an average. As the headers took weight they would bend and sometimes break in the center, making a bad looking job of the timbering. On several occasions brakemen were rolled between the top and the loaded cars. Company rules were to the effect that two sets of headers must be erected for each cut of 6 ft. This job kept two timbermen busy ahead of each machine. It was thought that the coal could not be mined in any other way.

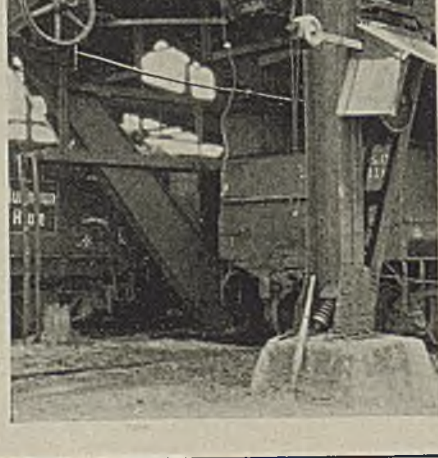
In one place on the main haulway the headers sagged so low that the locomotives could not clear them and the writer, who had been foreman for only a short time, was forced to do something quickly in order to keep running. Safety posts were set in the center of the track under each header to protect the timbermen while they sawed out sections from the middle of each header in a stretch of about 100 ft. The length of the section taken from the middle of each header was sufficient to clear each rail. After the sawing a rope and a locomotive were used to pull out the safety posts. The top did not move. It was resting on the posts and was strong enough in the center to support itself.

The district mine inspector was then consulted and he advised similar treatment of headers in more of the entries. Results were so satisfactory that finally all headers in the mine were treated in that way. From then on, in all fresh advances a half header of oak 6x6 in. x 3 ft. was used, being so placed as to allow sufficient clearance from the rail and placing the post under the center of it. Under this system the company not only saved thousands of dollars in timbers but cut off the two timbermen who worked in advance of each cutting machine. The loaders were able to set the half headers without help.

Pipes Assure Control of Gravity Car Retarder

Wire ropes controlling car retarders under tipples which load two or more cars on a single track may, through some combination of circumstances, be hung up when slack is provided for the release of the brake on the retarder. Reference is here made specifically to an installation where a retarder is controlled by a system of ropes and pulleys from two or more points. The result of this hanging up of the control wires may be a runaway car and perhaps a fatality.

A Sensitive Retarder Control



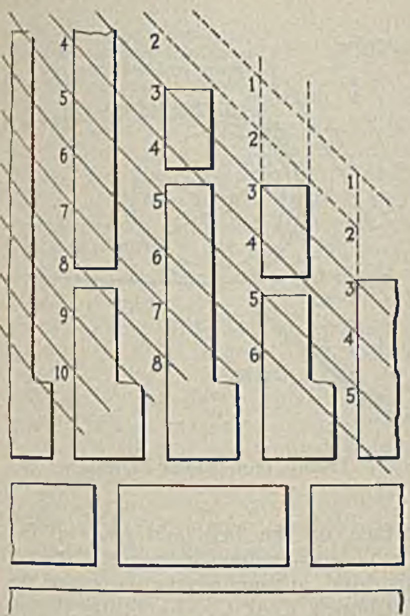
The possibility of this happening was eliminated from the retarder installation on the rescreening plant at the No. 8 mine of the Old Ben Coal Corporation, West Frankfort, Ill., by the substitution of ½-in. pipes for the customary ropes, in a system similar to that used by the railroads for actuating track switches from a switch tower. These pipes ride on eye pulleys in the same manner as in railroad practice and change of direction is effected by compound levers which make for easy operation.

If in this installation the gravity weight of the retarder brake should happen to become hung up, a mere push of the pipe controls would bring it down. A still greater push on the pipe will tighten the brake to a degree greater than that provided by the gravity lever.

Marks on Rib Keep Pillars in Line

Where pillars should stand at any one time to maintain a straight pillar line is sometimes rather a puzzle to the mine foreman who has pillars to draw and no means of ascertaining their proper relation to the general advance.

Charles Guthrie, mine foreman, Harlan Fuel Co., Yancy, Ky., suggests that the mine engineer when surveying the mine should be asked to mark on the ribs of every pillar to be drawn numbers that would indicate the relative positions which each pillar should occupy at any stage of the withdrawal. He then would know at any time just



Numbers on Rib Facilitate Complete Coal Recovery

how closely he was approaching perfect alignment. Without it he might have a grievously irregular pillar line, that would bring a crushing load on salient angles and on the timber placed at such points.

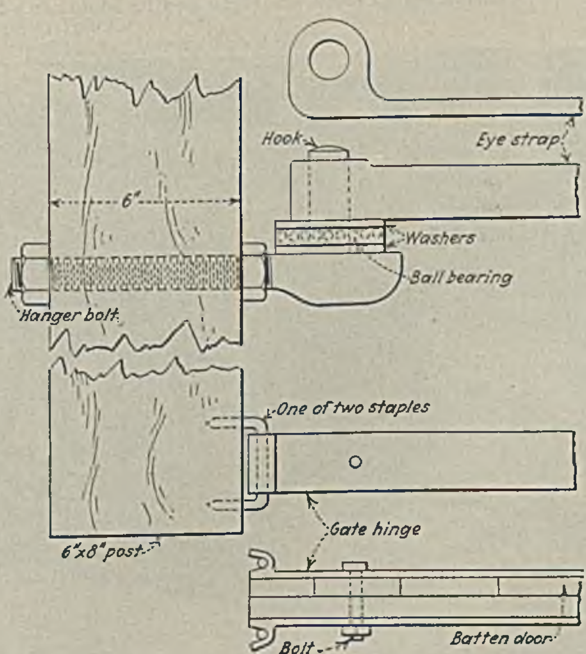
WHAT Are They Worth ?

Among the operating ideas appearing in these pages is one by a contributor who says it saved a coal company many thousands of dollars. If you follow these pages closely, month after month, you may be fortunate enough to find an idea that will save a sum of four or five figures for your company. *Coal Age* publishes over two hundred of these ideas in a year's time—fifteen to twenty each issue. Not one of them is imaginary; each must have been tried before being accepted, and none describes a commonplace practice or method. All of them ring as true as the ideas you have developed, which, by the way, the editors would like to have from you. Write them up, attach a sketch or photograph to each and send them in. The rate is $5 and up for each idea.

Ball-Bearing Mine Door Said to Be Safe

A mine door mounted on a ball-bearing hinge which eliminates worry lest a door be left open and which avoids the necessity of keeping a trapper in attendance is a contribution made to this department by H. F. Dabney, air and gas man, No. 1 mine of the O'Gara Coal Co., Harrisburg, Ill. As indicated in the accompanying sketch, the ball bearing is a part of the upper hinge. It is put on the hook of the hanger bolt, between two heavy washers, and carries the weight of the door through the eye strap which rests upon it. Pivoting at the bottom of the door is accomplished in the usual way by two gate-type straps which engage two staples driven into the door post. This post is slanted slightly off the vertical, as also is customary.

The old type of door hinge has never been entirely reliable and in some instances stands open or half shut unless it is closed by hand. For this reason and others it is frequently torn from its hinges or badly smashed. A door mounted on this ball-bearing hinge invariably closes to center.



Hinge Details for a Door With Ball Bearings

Improving Hydraulic Jacks on Loaders

It has been the experience at the No. 9 mine of the Peabody Coal Co., near Taylorville, Ill., that the cylinder walls of cast-iron hydraulic jacks on loading machines are likely to be somewhat rough, even with careful machinery. The plunger leathers, consequently, tend to become torn and cut, and the cylinder then will lose its pressure at a rate greater than might normally be expected.

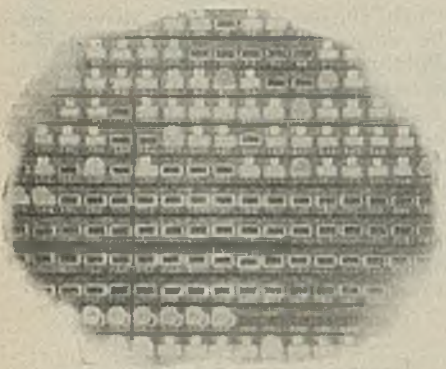
To overcome this fault the company is making a practice of boring out the hydraulic cylinders for the accommodation of brass lines. These lines are of cold-drawn seamless tubing, which has a natural surface finish far smoother and a diameter more uniform than cylinder walls that are machined. The brasses are 4 in. in diameter inside, ⅛ in. thick and 12 in. long. They are pressed into the cylinder hydraulically in a fit which is made a thousandth or so tighter than metal to metal.

The results obtained by this change are less frequent replacements of leathers and a better sustaining of pressure during the interval between replacements. The machining and fitting of a brass in one cylinder takes one machinst about seven hours. This time does not include the taking down and assembly of the jack.

A Checking-In System That Is Accurate

At the mines of the United States Fuel Co., in Utah, a system for the checking in and out of miners is in force which, though perhaps a little more complicated than that used at the majority of coal mines, is more accurate, convenient and comprehensive, according to J. P. Russell, general safety inspector of the company. The miner's check is an aluminum disk a little larger than a dollar coin. One of these checks is issued to each man as he goes on duty and must be returned to the checkman at the end of every shift. Failure to return the check incurs a small penalty.

The check board is provided with stenciled numbers, over each of which



This Board Tells Everything

is a small card clip. The latter carries a card on which is typed the name, occupation and house number of the man to whom has been assigned the particular number. Ready access to this information enables the management to get in touch quickly with any of the men in an emergency.

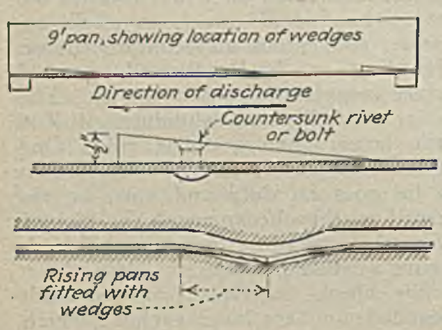
Directly over each card clip and number is the usual hook, on which is placed a small square brass tag bearing a number corresponding with the stenciled number under the hook. This small tag is completely covered by the aluminum check when the latter is placed on the hook. The object of the brass tag is to show what numbers are in use and those that have not been checked out. When any number is not in use the brass tag for that number is kept off the board.

Wood Wedges on Shaker Avoid Bridging of Dips

A simple and effective method of assisting coal up the rise of an undulation in a thin seam when this material is being transported by shaker conveyor, writes W. J. Leonard, of Broomhill Collieries, Ltd., Northumberland, England, is by attaching three or four wood wedges to the inside surface of each "rising" conveyor pan. The wedges are made 4 in. wide, about 6 in. long and taper from a thickness of ½ in. to 0. These wedges are held in place by countersunk rivets.

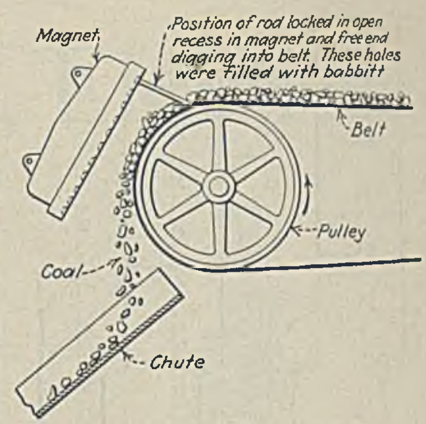
With the thick end of the wedges turned to the delivery end, the coal will travel up and over the wedges on the back stroke and will be kept from sliding back on the forward stroke. This method might well be applied to similar conditions in thick seams, which generally are corrected by building up and otherwise bridging undulations or dips, a scheme which is altogether impracticable where the coal bed is thin.

Details of Wedge Arrangement



Tramp Iron Tears Belt If Lodged in Magnet

Large electric magnets installed at the end of belt conveyors function satisfactorily in the removal of tramp iron, but when they are used in the manner indicated there is danger of the longer pieces of tramp iron standing on end in the recesses in the face of the magnet. These recesses accommodate the bolts which hold the magnet face to the casing. Should this occur the projecting pieces might make contact with the surface of the belt and tear it. The trouble was avoided in an installation of this kind at one of the mines of the Pittsburgh Coal Co. by filling the recesses in the magnet face with babbitt metal.



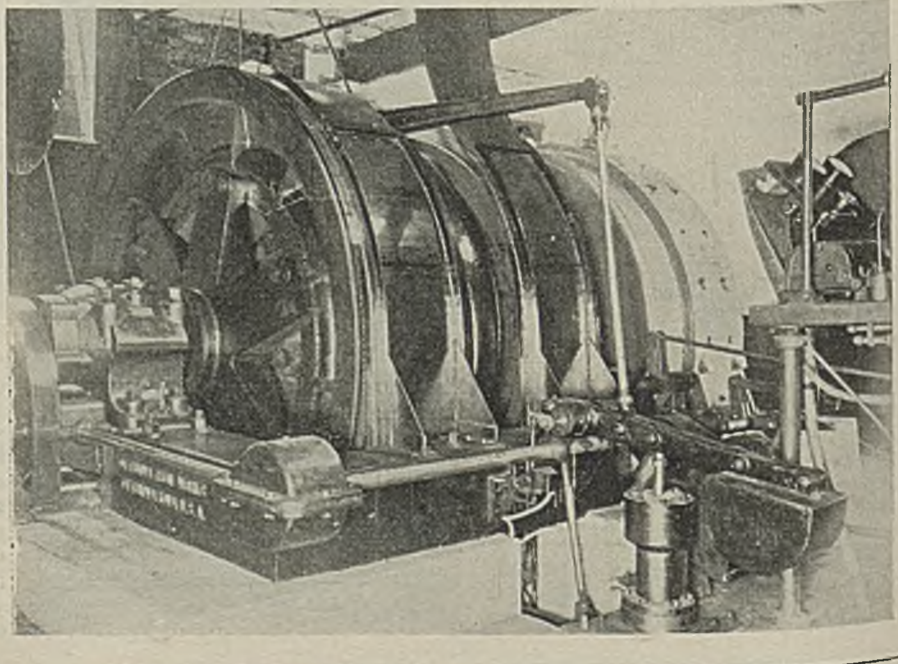
Tramp Iron Made Harmless

Synchronous Motor and No Flywheel In Ward-Leonard Controlled Hoist

SEVERAL features departing from the usual in large electric hoists are incorporated in a recent installation at Mine No. 53 (Woodside) of the Peabody Coal Co., Springfield, Ill. The motor-generator supplying direct current to the hoist motor is driven by a 1,100-kva. 900-r.p.m., 2,300-volt synchronous motor. It is without flywheel as no drop in speed, allowing a flywheel to give up energy, is possible with an induction-motor-driven set.

The control is similar to that of flywheel sets in that Ward-Leonard control of the hoist motor is used. This employs variable voltage by master control of the generator field. The motor generator is started and stopped by push button from the hoisting engineer's platform. Automatic oil contactors and auto-transformers suitably controlled by timing and protective relays bring the set to speed and place it on full voltage with proper field excitation. A solenoid-operated breaker in the main direct-current circuit is closed when the engi-

Considering Its Duty, the Hoist and Its Motor Is a Small Compact Unit



neer places the main controller on "off" position and pulls the brake to full-set position.

The direct-current generator is rated 750 kw., 400 volts, and the hoist motor is rated 850 hp., 116 r.p.m. and 400 volts. All fields are supplied by a 28-kw. 250-volt direct-connected exciter.

The mine is equipped with cars that carry but 3,000 lb. of coal and the lift is 238 ft., therefore a rapid cycle of hoisting is necessary. The steam hoist which was replaced had an average capacity of 230 cars per hour and the electric hoist was designed for the same performance. Careful proportioning of the drum and the selection of modern control equipment contributed to make this possible.

The drum, which was designed and built by the Ottumwa Iron Works, is of the double cylindro-conical type and is 5 to 9 ft. in diameter. Electrical equipment and control were designed and built by the General Electric Co. Performance of the hoist follows closely the cycle estimated by the manufacturers.

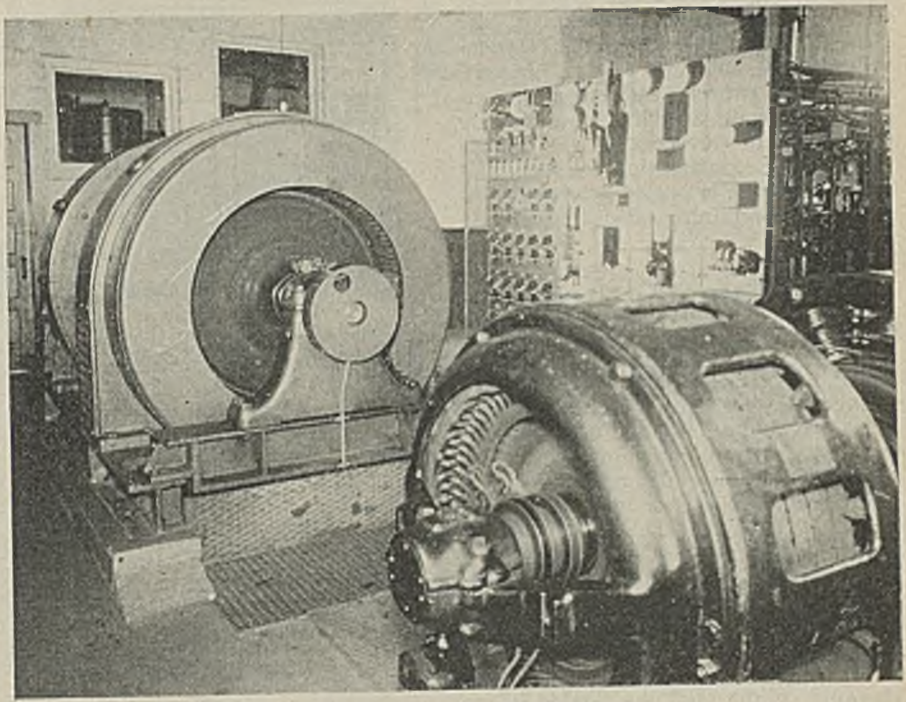
The Ward-Leonard control consists essentially of a lever-operated drum-type master controller which actuates definite time-limit relays governing contactors for the generator field rheostat. The relays are in two groups, one for acceleration and another for retarding.

In operation the engineer throws the controller handle directly to full-speed position and at a point predetermined by cams driven from the main drum shaft he brings the controller to the "off" position or to one point "on," causing the automatic relays to drop out the contactors, thus bringing the hoist to the corresponding slow speed for dumping.

Since acceleration of loads and the regenerative braking are reflected on the input to the synchronous motor the swings from maximum to minimum input are much greater than if the hoist were driven by a flywheel-type motor-generator set. Maximum input is approximately 1,000 kw. and minimum input about 500 kw. The rapid cycle does not inflict any penalty on the power cost because the Illinois Power Co. schedule of maximum demand is based on a 15-minute interval.

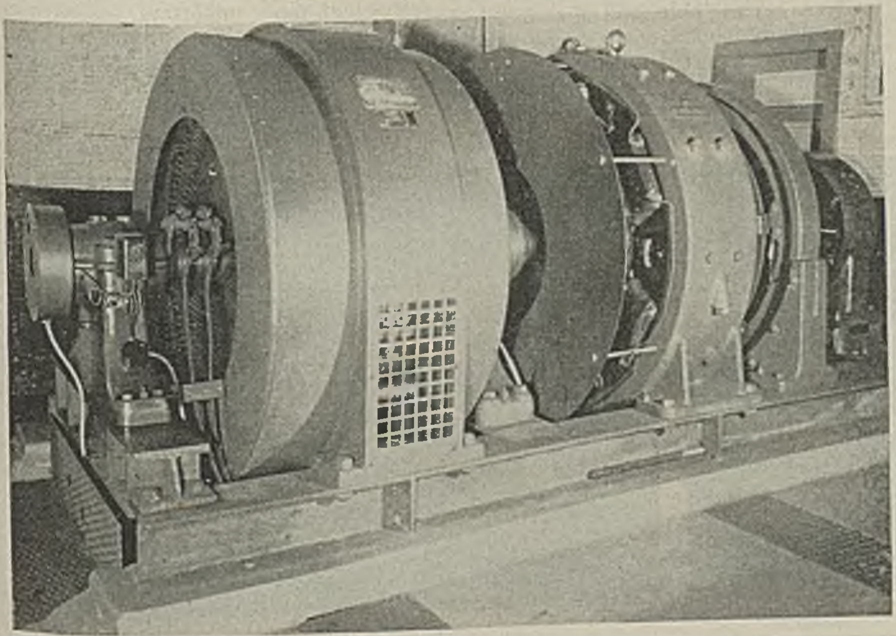
In regular operation the equipment has made 250 hoists per hour, thus improving on the estimate of the manufacturers. Part of this was accomplished by reducing the caging time below the estimate.

The use of a synchronous motor instead of a flywheel induction set, and the use of a direct-connected hoist motor reduced the initial cost of the installation, conserved floor space, resulted in a 2 or 3 per cent higher efficiency, allowed the use of remote-control automatic starting, eliminated the necessity of providing an auxiliary geared hoist, saved the weight of a large flange gear, allowed the use of one Lilly controller for safety protection and simplified the assembly in general.



A Small Room Contains the Hoist Motor-Generator, a 150-Kw. Substation Unit and the Controls for Both

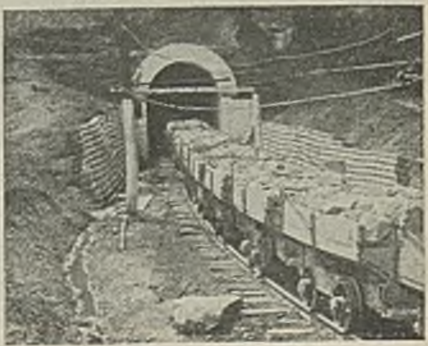
The Speed of a Synchronous Motor Is Not Dependent on Load, Therefore the Flywheel Is Omitted From the Set



Use Hollow-Tile Walls Where Soil Is Loose

Besides being suitable material for the construction of arched linings for slopes, drifts and, at greater depths, for entries, hollow tile may be used in the construction of retaining walls where excavations have been made on steep watersheds in loose surface soil.

Solves a Perplexing Problem



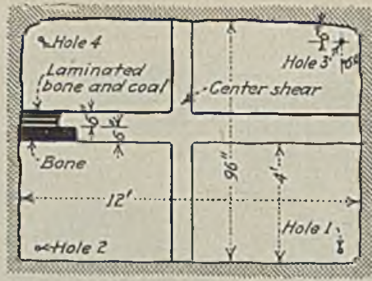
Hollow tile has been put to this latter use at the Haydenville mine of the National Fire Proofing Co., Haydenville, Ohio, and the results obtained have been entirely satisfactory, it is said. The walls are built loose and are inclined in the direction of the hillside slope. The construction is such that ample drainage is provided without impairing the retaining effect of the wall.

Steel Tamping Anchor For Cushion Blasting

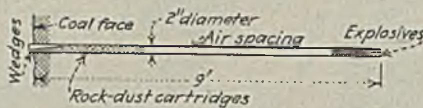
The process of cushion blasting, augmented by steel shaft wedges and dummies of rock dust, is being used successfully at a certain mine in the driving of entries by loading machines in a 96-in. seam which is divided by a 12-in. binder 4 ft. from the bottom. This binder consists of two 6 in. strata, the upper being laminated coal and bone while the lower is bone alone. The coal is comparatively hard and is well developed by butt and face cleats and by bedding planes. Preliminary to the shooting of the coal the binder is removed by a track-mounted cutting machine which in the first sweep across the face cuts out the 6-in. lamination of bone and coal; for the second sweep the cutter bar is lowered 6 in., in which position it cuts and rakes out the bone in the lower half of the binder. The cutter bar is then turned into a vertical plane and a center-shear cut made as indicated in sketch *A*.

Cutting having been completed and the kerfs scraped and otherwise cleaned, four 2-in. holes 9 ft. deep are drilled electrically at the four corners of the face in positions shown in sketch *A*. The sequence of shooting these holes is given by the numerals 1, 2, 3 and 4. Only one hole is set off at a time.

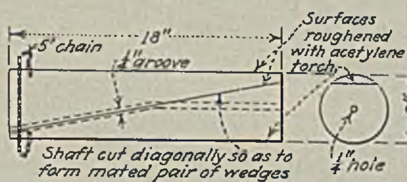
Details of the arrangement of the charge and of the tamping wedges are presented in sketches *B* and *C*. Permissible explosive in cartridges of 1¼-in. diameter is used. Holes 1 and 2 are charged with four cartridges or 1⅓ lb. of explosives and in holes 3 and 4 is



A—Method of Cutting



B—How Holes Are Charged



C—Details of Wedges

placed one stick or ½ lb. of explosives. Dummies of rock dust are then inserted in the hole, leaving an air spacing of considerable length in front of the explosives. Finally, tamping is completed by a mated pair of plano-cylindrical wedges which are driven tight by sledge. The length of rock-dust stemming and the dependent length of air spacing must be governed by conditions; but it is suggested that as a minimum 2 ft. of stemming be used.

A pair of wedges is constructed from an 18-in. length of 2-in. cold-rolled, round shafting. The piece is cut diagonally into halves as shown and the surfaces, both plane and cylindrical, are roughened by the flame of an oxyacetylene torch. A ¼-in. hole is drilled through the center of one wedge and this hole joins a channel which is cut by torch on the plane surfaces of the two wedges. This hole and the matched channels accommodate the firing cables. The wedges are tied together by a 5-ft. chain which serves the double purpose of keeping them together and of enabling them to be found readily after shooting. The wedges have never been known to leave the hole as a projectile; they merely drop with the coal to the floor. Inasmuch as the face is both center cut and sheared and since the coal is lightly shot, blown-out shots are unlikely, it is said.

Through the use of this system of blasting, the handling of coal near the roof has been largely eliminated. The coal is lumpier, more uniformly sized and more readily loaded by machine. Also the roof is not unduly disturbed or fractured by the force of the blasts.

Continuous Gage Records Gob Pressure

As a means of determining the pressure in abandoned and sealed panel areas, the Valier Coal Co., operating in southern Illinois, uses a recording pres-

Tells What Is Happening Behind Sealed Abandoned Panel Areas

sure gage which is attached to the bleeder valve at one, and then another of the panel seals and left in place for a period of 24 hours. This gage records pressures from 0 to 10 lb. on a 24-hour chart. It is being used to determine the relation between outside and inside pressures and, more important, to determine what readings on the barometer located on the surface mean as reflecting a change of conditions behind the seals.

Result of Cutting

Results of Shooting

WORD *from the* FIELD

Purchases for Production May Be Expensed

Decree and findings of fact recently signed by Judge William I. Grubb, U. S. District Court for the Northern District of Alabama, in the income tax case of the Roden Coal Co., hold that purchases made to maintain production in coal mines and which do not either increase production, decrease the cost or add to the value of the property as a going concern may be expensed rather than capitalized, as now required by the Bureau of Internal Revenue and the Board of Tax Appeals.

Coal Conference Suggested

A conference of coal operators and expert economists to discuss remedies for the ills threatening disaster to the bituminous coal industry was suggested to President Hoover by Representative Frank L. Bowman (Republican) of West Virginia, July 11. Congressman Bowman announced after his visit that the President had been considering several remedial plans and had already conferred with many prominent coal operators, labor leaders and coal-association officials throughout the United States without results. This failure was due primarily to the wide and divergent ideas as to the causes of the present coal depression and also to the apparent inability of the coal-producing industry to agree upon a definite plan of stabilization.

Safety Award Made

No. 12 mine of the Madison Coal Corporation, Dewmaine, Ill., recently was awarded a certificate of honor by the Joseph A. Holmes Safety Association for having worked an average of 760 men from Sept. 20, 1925, to Jan. 20, 1929, producing 2,211,393 tons of coal, without a fatality. An average of 633 men worked through a seven-year period, producing 802,434 tons, without a fatality.

P. & R. Enters Power Field

Officials of the Philadelphia & Reading Coal & Iron Co. have applied for the incorporation of 33 electric companies for township distribution in Pennsylvania, and plans are being made for the erection of a power plant to burn the fine sizes of coal. Twenty of the distributing companies will be in Schuylkill County, two in Dauphin, ten in Northumberland and one in Columbia County.

Real Bituminous Situation To Be Shown

That the real situation in the bituminous coal industry can be developed is the hope of the market research institute of the National Coal Association which, with the approval of the board of directors, is sending out a questionnaire covering four six-months' periods beginning July 1, 1927. The tonnage produced and the profit and loss in each period will be requested. Compilations will be made for each period and it is expected that they will show not only the exact financial condition of the industry but also the trend.

Industrial Coal Reserves Show No Decrease in June

Stocks of anthracite and bituminous coal in the hands of industrial consumers in the United States and Canada on July 1 totaled about 30,250,000 tons, according to the monthly report of the National Association of Purchasing Agents. Consumption during the month of June fell off nearly 2,750,000 tons as compared with May, being approximately 34,500,000 tons. The number of days' supply on hand remained at 26 days, as both stocks and consumption fell off in about equal proportions.

Days' Supply of Bituminous Coal in Various U. S. Industries

Byproduct coke	15
Electric utilities and coal-gas plants	50
Railroads	21
Steel mills	26
Other industries	29
Average total bituminous stocks throughout the United States	25

Estimates of Output, Consumption and Stocks in Net Tons

	United States Production	Industrial Consumption	On Hand in Industries
June, 1928	41,264,000	32,784,000	40,890,000
July	41,785,000	33,527,000	40,700,000
August	48,598,000	33,890,000	39,415,000
September	48,332,000	34,223,000	40,090,000
October	58,914,000	36,500,000	40,778,000
November	53,498,000	35,879,000	41,520,000
December	49,606,000	37,354,000	41,010,000
January, 1929	58,500,000	35,518,000	41,492,000
February	54,000,000	38,175,000	40,808,000
March	44,391,000	40,566,000	40,108,000
April	43,329,000	37,750,000	35,385,000
May	46,480,000	37,298,000	33,468,000
June	42,969,000	34,585,000	31,282,000
July 1	....	....	30,240,000

Depreciation Schedule Being Prepared

The engineering section of the income tax unit of the Internal Revenue Bureau, according to reports, is preparing a tentative schedule of depreciation rates on numerous items, including mining machinery, equipment and buildings, based on an examination of mining company returns, for publication in December. The rates outlined in the report, it is said, are to be considered as a guide and will not be binding on the individual taxpayers. The procedure in making the computations is said to follow recommendations of mining representatives.

Fuel-Oil Tariff Asked

Pointing to the intense competition of fuel oil, Harry L. Gandy, executive secretary, National Coal Association, in a hearing of a subcommittee of the U. S. Senate Finance Committee, said that the bituminous industry has accepted domestic competition philosophically, but that it has no patience with the loss of markets to foreign oil. He urged a moderate duty on petroleum for the protection of both the bituminous and oil industries serving the fuel markets along the Eastern seaboard.

Fuel Study Continued

The Shipping Board's fuel conservation research and marine power study will not be suspended as a result of the government's decision to curtail the activities of the Emergency Fleet Corporation, according to a recent Washington announcement. On the contrary, the activities of the fuel conservation section will be expanded and it is expected that a large part of this year's $500,000 fund will be used in furthering the cause of fuel economy, including the utilization of pulverized coal on shipboard.

Ohio Boosts Its Coal

The Ohio Board of Control, in charge of emergency appropriations, recently awarded $15,000 to the committee of operators and state officials chosen to investigate the Ohio coal industry with the view of extending the use of Ohio-mined coal. The investigation will be carried on largely through the department of mining engineering of Ohio State University. The Engineering Experiment Station has established Project 100, "Investigation of Ohio Coals," as its part of the program.

New Power Development For Chicago Area

Announcement was made July 23 of the organization of the Industrial Power Corporation, incorporated under the laws of Delaware, for the processing of coal and the furnishing of electrical power, gas and steam to the stockyard district of Chicago, including Packingtown, and the entire industrial area adjacent. The physical properties of the new plant will include a central-station power plant having a capacity of approximately 100,000-kw. and designed for an ultimate steam plant of twelve 25,000-sq.ft. high-pressure boilers. Fuel will be supplied by a "K.S.G." low-temperature coal-carbonizing plant, designed for an ultimate capacity of 45,000,000 cu.ft. of gas per day. Industries to be served by the new company are now burning 5,000 tons of coal a day.

Bituminous Combination Offered Industry

A new coal-land holding company, tentatively known as the "Coal Corporation," to be organized for the purchase of all the active coal lands in the competitive states, has been proposed by J. A. Paisley, president, Valley Camp Coal Co., Cleveland, Ohio. Land would be paid for in stock of the corporation, which would lease a certain workable acreage to the present owner or, possibly, help him sell his plant to some other company for operation.

Other provisions of the plan include a reasonable royalty, which will at the same time cover taxes and depletion and return 6 per cent to the stockholders, to be charged the operating company; control and allotment of leases; government approval, and a program of improvement in production methods.

"The whole matter," Mr. Paisley states, "is based on being allowed to put the coal lands together at a fair value, charging a royalty sufficient to yield a reasonable interest—not to exceed 6 per cent—after setting aside a proper amount for operating." Economical operation, short hauls to the proper zone of distribution and a competitive price controlled by production, plus the set royalty and a satisfactory profit, should then enable the coal to be sold to the public at $2 a ton, or even less, it is suggested.

Trade-Practice Code Adopted

The Virginia Coal Operators' Association, at a meeting July 20, adopted a code of trade practices "For the purpose of establishing a fuller degree of co-operation among bituminous coal producers and members of the Virginia Coal Operators' Association, to provide for fair and open competition among them, and to eliminate undesirable trade practices." Formation of a separate bureau or organization for the execution of the code is being considered by a separate committee.

Anthracite Men to Push Heating Equipment

Organization of the Anthracite Equipment Corporation, formed on the initiative of the Anthracite Operators' Conference to finance and promote the sale of improved heating and heat-control devices, was completed Aug. 8, with the election of the following board of directors: Eliot Farley, president, Delaware, Lackawanna & Western Coal Co.; A. J. Maloney, president, Philadelphia & Reading Coal & Iron Co.; Daniel T. Pierce, vice-chairman, Anthracite Operators' Conference; Thomas Dickson, Dickson & Eddy, and C. A. Connell, acting manager, Anthracite Coal Service. Daniel T. Pierce was elected president of the new company, and A. S. Moody, secretary and general manager.

The primary object of the new company is not profit making but the distribution of desirable appliances on an economical basis, and it will interest itself only in devices which have been tested and approved by the engineering laboratory of the Anthracite Operators' Conference, says a statement issued by the hard-coal producers.

New Plant Construction

New contracts for topworks and construction under way or completed at various coal operations reported in July include the following:

Buckeye Coal Co., Nemacolin, Pa.; contract closed with the Koppers-Rheolaveur Co. for a coal-washing plant, capacity 600 tons per hour. Coal from the Pittsburgh seam will be treated, the 4x$\frac{5}{16}$-in. size in one plant and the minus $\frac{3}{16}$-in. in another Sludge thickeners and driers also will be installed.

Consolidation Coal Co., Coalwood, W. Va.; contract closed with the Fairmont Mining Machinery Corporation for equipment for new pea-coal screening plant.

E. C. Minter Coal Co., Francis, W. Va; contract closed with Roberts & Schaefer for Menzies Hydro-Separator coal-washing equipment, capacity 100 tons per hour of stove and pea coal. To be completed Oct. 1.

Ellsworth Collieries Co., Ellsworth, Pa.; contract closed with Roberts & Schaefer for three-track tipple complete with Marcus screens, capacity 650 tons per hour. To be completed Nov. 1.

Munsen-Bache Coal Co., Flatt, Ill.; contract closed with the Morrow Mfg. Co. for five-track tipple complete with shaking screens, loading booms, mixing conveyor and crushing equipment, capacity 600 tons per hour.

Pennsylvania Coal & Coke Co., Cresson, Pa.; contract closed with Roberts & Schaefer for Menzies Hydro-Separator coal-washing equipment, capacity 100 tons per hour of egg, stove and pea coal. To be completed Oct. 1.

Pursglove Coal Mining Co., Pursglove, W. Va.; contract closed with Roberts & Shaefer for four-track steel Marcus tipple, capacity 400 tons per hour of lump, egg, nut, pea and slack. To be completed Dec. 1.

The Interstate Commerce Commission, July 24, on its own motion ordered a general investigation into railroad purchases and the effect of such purchases on the routing of traffic by manufacturers, dealers and others.

Current Earnings Reports

The Island Creek Coal Co. reports for the six months ending June 30 a net profit of $1,487,652 after depreciation, depletion, federal taxes and other charges, compared with $1,222,904 in the corresponding period in 1928. Net profit for the June quarter after charges was $669,498, as against $543,829 in the second quarter of the previous year.

Anthracite production of the Hudson Coal Co. in the first six months of 1929 increased 26.73 per cent and sales increased 15.51 per cent compared with the same period in 1928. Gross earnings increased 11.42 per cent and net income increased $2,768,000. After interest on the first mortgage bonds there was a small deficit.

The Truax-Traer Coal Co. and subsidiaries report for the period ended June 30, 1929, after depreciation, depletion, interest and income taxes, net profits of $196,407, equivalent to 80c. per share on the 245,000 shares of outstanding common stock.

The Lehigh Valley Coal Corporation reports for the quarter ending June 30 net loss of $168,707 after depreciation, depletion, interest and taxes, as compared to a net income of $498,534 for the corresponding period of 1928. Six months' net income was $1,374,571, as compared to $1,624,782 in 1928.

The United States Distributing Corporation and subsidiary companies report for the six months ending June 30, 1929, consolidated net profit of $538,867 after depreciation, depletion, interest and federal taxes. Profits in the first half of 1928 were $268,769.

The Peabody Coal Co. reports consolidated net income of $921,539, after depreciation, depletion and federal taxes, for the year ended April 30, 1929, equivalent to $6.15 a share on the 149,883 shares of $100 par value preferred stock outstanding.

The M. A. Hanna Co. and subsidiaries report a consolidated net income of $1,733,454 for the six months period ending June 30, equivalent to $15.47 a share on the 7 per cent preferred and $2.33 a share on the common, as compared with $446,659, or $3.99 a share, on the 7 per cent preferred and $1.71 on 31,680 shares of 8 per cent preferred for the corresponding period in 1928.

The Pennsylvania Coal & Coke Corporation reports for the three months ending June 30 consolidated net loss after depreciation and depletion of $28,589, as compared with $216,882 for the second quarter of 1928. The net loss for the six months was $24,351, compared with $420,590 in the first half of 1928.

The Elk Horn Coal Corporation in the first half of 1929 reports earnings of $2,350,861 from operations, while operating profit after expenses, taxes, insurance and royalties was $324,085. Total income amounted to $368,015 and net income before reserves was $147,187. After depreciation and depletion reserves, the net loss was $50,347, as compared to $152,847 in the first half of 1928.

Labor Unrest Again in Evidence In Bituminous Fields

UNEASINESS over the labor situation is finding expression in several of the mining fields of the country at the present time. Dissatisfaction seems to be most open in western Kentucky and in Indiana. Wages in western Kentucky have been an uncertain quantity ever since the Illinois agreement last fall. A few weeks ago it was reported that no operator of importance was paying over the 1917 scale. This situation has been intensified further since the middle of July by reductions said to carry the scale to 20 per cent below the 1917 basis.

Union organizers has been active and a number of miners in Webster County are reported to have again cast their lot with Indianapolis. An organization meeting was held at Madisonville on July 23 and the following day there was trouble at one of the operations of the West Kentucky Coal Co. T. E. Jenkins, vice-president of the company, stated that there had been a "demonstration of union men and their sympathizers" at the No. 10 mine and that operation had been shut down.

Operators in that section decline to abandon the open-shop policy adopted several years ago. Because of the activity of the union organizers it is not thought unlikely that the open-shop policy will be so modified as to bar any union men from employment. In the meantime union district representatives continue to announce fresh recruits to their ranks. An Associated Press dispatch quotes W. D. Duncan, in charge of union activities, as saying that contracts would be submitted to the operators this month.

In Indiana the major fight centers around the operations of the Knox Consolidated Coal Co., now working under the protection of an injunction designed to prevent interference with mining by the United Mine Workers. Spokesmen for the Indianapolis organization are bitter in their denunciation of the National Miners' Union and accuse members of that dual organization of accepting work at $5 when the union scale in that state calls for a day wage of $6.10.

Open warfare flared up in Indiana with an attack upon workers at the Bono Coal Co., Dana, in which over 40 men were beaten. The Bono company is an organization of stockholder-miners and all men employed hold stock in the enterprise. I. O. Travis, speaking for the operators of the mine, stated that the company had been unjustly accused of being a co-operative institution and employing non-union labor. Two deputies, assigned by Attorney General James M. Ogden, of Indiana, to investigate the riot and subsequent reports of threats and intimidation, are quoted in press dispatches as having reported that "another Herrin massacre" would follow attempts to prosecute the offenders. Union officials insist that a communist miner group was responsible for the attack.

Another dual organization—the Anthracite Mine Workers' Union—went out of existence July 26 with the transfer of its charter, office equipment and records to District No. 1, United Mine Workers. This action marks the end of a fight by an insurgent group for the separation of the hard-coal region from the bituminous fields. Rinaldo Cappellini, Plainsville, Pa.; Frank McGarry, Pittston, and Edward Hogan, Wilkes-Barre, former officers of the dual organization, are expected to ask for reinstatement in the United Mine Workers.

Strife between the international organization and the district union has broken out in Illinois. President John L. Lewis some time ago removed the officials of Subdistrict 9 of District 12. Effort of the subdistrict officials to stay the effect of this action by injunction proceedings met with failure on July 9, when Circuit Judge Kearns of Franklin County dissolved a temporary restraining order and upheld the disciplinary powers of the international officers.

Further evidence of friction appears in a first-page editorial in *The Illinois Miner* of Aug. 3. This paper, published by the executive committee of District 12, after defending the agreement entered into with the operators last October and contrasting working conditions in the state with those in other fields, declares that there are more dues-paying members of the union in Illinois than in all the other districts in United States and Canada combined. Strong resentment against attacks on the contract by "international organizers and ex-officials of extinct bituminous districts" is voiced.

"The miners of Illinois are not looking for a fight. What we want is peace and work. But as the principal contributors to the salaries of the visiting international organizers and ex-officers of ex-districts," the editorial concludes, "we believe we are well within our rights when we insist that they be sent to Kentucky, West Virginia or any other unorganized district where a little trouble making would be all to the good. We are getting just a little tired of paying the brethren for paying us visits without invitations."

Wage reductions of 10 per cent have been announced by some Ohio operators who have been paying the $5 scale.

Anthracite Committees Appointed

Committees for the control of the major activities of the Anthracite Co-operative Association were appointed by Joseph F. Noonan, July 23. Appointments include those for the finance, executive, program, publicity, market survey, legislation, taxation, anthracite education and anthracite spirit committees. For the public, Joseph F. Noonan, Warren T. Acker, Roy C. Haines, C. W. Laycock and Dr. W. R. Buckley were appointed on the executive committee. Alan C. Dodson, Weston Dodson Co., Bethlehem, Pa., and Thomas Kennedy, Hazleton, are representatives of the operators and the mine workers, respectively.

On the market survey committee, L. E. Enterline, B. J. Duffy, Raymond B. Gibbs, George Haupt, Jr., and Wellington M. Bertolet were appointed to represent the public. John Brydon, Pennsylvania Coal Co., Dunmore, Pa., and Alan C. Dodson, Weston Dodson Co., Bethlehem, Pa., were appointed for the operators. Michael Hartneady, Hazleton, Pa., was chosen as the miners' representative.

Wyoming-Association Elects

At the annual meeting of the Southern Wyoming Coal Operators' Association, held at Rock Springs, Wyo., July 20, P. J. Quealy, president, Gunn-Quealy Coal Co., Kemmerer, was elected president for the coming year. L. T. Dee, president, Ideal Coal Co., Ogden, Utah, was chosen vice-president, and V. J. Facinelli, president, Rock Springs Fuel Co., Rock Springs, Wyo., treas-arer. L. W. Mitchell was reappointed executive secretary.

Anthracite Prices at New York, Effective Aug. 1, 1929

(Gross Tons, F.O.B. Mines)

	Broken (Grate)	Egg (Furnace)	Stove	Chestnut	Pea	Buckwheat	Rice	Barley
Lehigh & Wilkes-Barre Coal Co.	$8.00	$8.50	$9.00	$8.50	$4.80	$2.75	$2.00	$1.50
Delaware, Lackawanna & Western Coal Co.	8.30	8.50	9.00	8.50	4.80	*2.75	2.00	1.50
Philadelphia & Reading Coal & Iron Co.	8.25	8.50	9.00	8.50	4.80	2.75	2.00	1.50
Lehigh Valley Coal Sales Co.	8.30	8.50	9.00	8.50	4.80	2.75	2.00	1.50
Lehigh Coal & Navigation Co.	8.30	8.50	9.00	8.50	4.80	2.75	2.00	1.50
Hudson Coal Co.	8.30	8.50	9.00	8.50	4.80	Prices on application		
M. A. Hanna Co.	8.25	8.50	9.00	8.50	4.80	Prices on application		
Dickson & Eddy	....	8.50	9.00	8.50	4.80	2.75	....	....
General Coal Co:								
Raven Run, Maryd., Westwood and Drifton	....	8.50	9.00	8.50	4.80	Prices on application		
Hazle Brook and Upper Lehigh	....	8.75	9.25	8.75	5.05	Prices on application		
Fuel Service Co:								
Beaver Meadow	....	8.50	9.00	8.50	4.80	2.75	2.00	1.50
Kingston No. 2 and Gaylord	....	8.50	9.00	8.50	4.80	2.75	2.00	1.50
Kingston No. 4	....	8.75	9.25	8.75	5.05	2.75	2.00	1.50
Westwood	....	8.50	9.00	8.50	4.80	2.75	2.00	1.50
Jeddo	....	9.10	9.60	9.10	5.80	Prices on application		
Highland	....	8.90	9.40	8.90	5.80	Prices on application		

*Domestic buckwheat, $3.25.

Washington Letter

By Paul Wooton
Special Correspondent

Further liquidation of excess capacity and progress toward more stable conditions are revealed by the statistical reports on bituminous mining in 1928. The Bureau of Mines has now published reports by F. G. Tryon and L. Mann on enough of the states to show clearly what has been happening since 1927. There has been a decrease in the number of mines, a sharp reduction in the number of men employed, steadier work for the men and mines that remain, and concentration of a larger proportion of the business in the larger and more efficient mines.

Figures have now been published for eight states. They include Pennsylvania and Maryland (two Eastern States now largely non-union), Indiana, Kansas, Wyoming (three union states), and Colorado, Utah, and New Mexico (three non-union states of the Far West). All but two of the eight states show a decrease in tonnage as compared with 1927, reflecting the general decrease for the industry as a whole which averaged 5 per cent. The two exceptions were Colorado and Utah, which show a slight increase.

All but the same two states show a decrease in number of men employed. In Pennsylvania there were 20,285 fewer men on the payrolls in 1928 than in 1927; in Indiana there were 7,546 fewer men; in Kansas, 1,013 less, and in Wyoming, 948 less.

Men Employed in Bituminous Mines

	1927	1928	Increase or Decrease
Pennsylvania.	153,699	133,414	—20,285
Maryland....	3,459	3,304	—155
Indiana......	24,352	16,806	—7,546
Kansas.......	7,004	5,991	—1,013
Wyoming.....	5,791	4,843	—948
Colorado.....	11,999	12,336	+337
Utah.........	3,339	3,352	+13
New Mexico..	3,456	3,441	—15

A sharp reduction also occurred in the number of mines in operation. In Pennsylvania 273 mines (commercial mines; not wagon mines) that operated in 1927 were shut down in 1928. In Indiana the number of active mines was 38 less than in 1927. Other states also showed a decrease, except Utah and New Mexico.

Number of Commercial Bituminous Mines in Operation

	1927	1928	Increase or Decrease
Pennsylvania.	1,830	1,557	—273
Maryland....	85	80	—5
Indiana......	207	169	—38
Kansas.......	235	232	—3
Wyoming.....	62	58	—4
Colorado.....	229	215	—14
Utah.........	36	38	+2
New Mexico..	37	39	+2

The mines and the miners remaining at work, however, generally worked more steadily. In Pennsylvania the average number of days worked rose from 203 to 218, an increase of 15 days. Maryland showed in increase of 13 days. In the southern Rocky Mountain States, however, the working time decreased.

Days Worked by Employees Of Bituminous Mines

	1927	1928	Increase or Decrease
Pennsylvania.	203	218	+15 days
Maryland....	220	233	+13 days
Indiana......	120	150	+30 days
Kansas.......	138	128	—10 days
Wyoming.....	189	214	+25 days
Colorado.....	196	193	— 3 days
Utah.........	209	191	—18 days
New Mexico..	251	213	—38 days

The mines and the men remaining at work in 1928 worked more efficiently. As shown in an accompanying table, there was a general increase in the output per man per day. The improvement was caused to no small extent by the advance of mechanization.

Average Tons of Coal Produced Per Man Per Day at Bituminous Mines

	1927	1928	Increase or Decrease
Pennsylvania.	4.26	4.52	+0.26
Maryland....	2.70	3.50	—0.20
Indiana......	6.13	6.49	+0.36
Kansas.......	3.57	3.68	+0.1
Wyoming.....	6.18	6.34	+0.11
Colorado.....	4.13	4.13	......
Utah.........	6.84	7.57	+0.73
New Mexico..	3.38	3.70	+0.32

With fewer mines and more efficient mines in operation, a larger proportion of the business was concentrated in the larger mines. In Pennsylvania, for example, the proportion produced by Class I mines (that is, mines with an output of 200,000 tons or more), increased from 57.8 per cent in 1927 to 64.9 per cent in 1928. Similar increases were shown by several other states.

Prices in 1928 showed a marked and regrettable decline. In Pennsylvania the average sales realization, f.o.b. mine, declined from $2.05 in 1927 to $1.90, a decrease of 15c. In non-union Maryland the decrease was 23c.; in Indiana it was 25c.; in Kansas, 36c.; and in Wyoming, 5c.

Per Cent of Output from Class I Mines 200,000 Tons and Over

	1927	1928	Increase or Decrease
Pennsylvania.	57.8	64.9	+7.1 points
Maryland....	15.6	9.4	—6.2 points
Indiana......	46.4	66.2	+19.8 points
Kansas.......	....	....	....
Wyoming.....	49.7	57.2	+7.5 points
Colorado.....	34.3	40.7	+6.4 points
Utah.........	53.3	64.3	+11.0 points
New Mexico..	50.6	36.0	—14.6 points

One area—the southern Rocky Mountains—stands out as a shining exception in the general gloom of declining prices. In Colorado, Utah, and New Mexico, operators obtained better prices in 1928 than in the year before.

Average Sales Realization by Bituminous Mines

	1927	1928	Increase or Decrease
Pennsylvania.	$2.05	$1.90	$—0.15
Maryland....	2.07	1.84	—0.23
Indiana......	2.03	1.78	—0.25
Kansas.......	2.80	2.44	—0.36
Wyoming.....	2.69	2.64	—0.05
Colorado.....	2.78	2.80	+0.02
Utah.........	2.32	2.53	+0.21
New Mexico..	3.13	3.18	+0.05

Safety in Mines Stressed In Alabama Meet

Thirty-three teams took part in the Eleventh Alabama First Aid Contest, held in Birmingham, July 6, under the auspices of the Alabama Mining Institute, the U. S. Bureau of Mines and other organizations. The Sipsey team of the DeBardeleben Coal Corporation won first prize. The team of the Newcastle Coal Co. was second in the competition.

Virginia Safety Day Set

The mine safety committee of the Virginia Coal Operators' Association recently voted to hold the Eleventh Annual Virginia State-wide First-Aid Contest at Norton, Va., on Aug. 24. In addition to the competition itself, the committee plans to have a parade and demonstrations of coal-dust explosions.

Bureau of Mines Approves Explosives

One addition to the active list of permissible explosives was made by the United States Bureau of Mines during the month of July, as shown in the accompanying table. Authority also was granted for the use of 175- and 200-gram heaters in the permissible blasting Cardox, Safety Mining Co., Chicago, under Schedule 20, Approval No. 1, Extension No. 5.

Additions to the List of Permissible Explosives During the Month of July

	Class—Designation Basis—Vol. Poisonous Gases	Class—Designation Basis—Characteristic Ingredient	Weight of 1¼x8-in. Cartridge, Grams	Smallest Permissible Diameter, Inches	Unit Deflective Charge, Grams	Rate of Detonation in 1¼-in. Diameter Cartridge, Ft. per Sec.
*Apache Coal Powder, H.L.F.	A	1a	164	1¼	229	10,920

* Apache Powder Co., Benson, Ariz.

In the approved list of permissible explosives published in *Coal Age*, July, 1929, pp. 430-431, the permissible explosive Austin Red Diamond No. 12, L. F., was listed as being manufactured by E. I. DuPont de Nemours & Co., Inc. This is incorrect, as Red Diamond explosives are made by the Austin Powder Co.

Union Pacific Old Timers Celebrate At Auditorium Dedication

"HELLO, OLD TIMER," rang the common greeting throughout the sun-drenched streets of Rock Springs, Wyo., July 19-20. The salutation, rising above the skirl of the pipes and the swell of the brasses and bringing a smile to the faces of wrinkled ancients and unscarred youth, was the watchword that told southern Wyoming and the rest of the mining world that the Old Timers' Association of the Union Pacific Coal Co. was gathering for its fifth annual celebration.

But this time it was more than just annual reunion; more, too, than the occasion for welcoming five newcomers into the ranks of the veterans of 40 years' service and the posthumous award of the 40-year gold buttons to two men. This time the celebration marked the realization of a dream—the dedication of an auditorium building for the organization.

The formal celebration of the Old Timers' Association was held on July 20. On the preceding day the interest of the miners was centered in an inter-company first-aid and mine-rescue meet, in which teams from Hanna boy and girl scouts walked off with the three first prizes in first-aid work, and the men's team from Hanna No. 1 nosed out its Superior No. 1 competitors by 1¼ points. Tom Butler, superintendent of Hanna, led the Old Timers' parade the next day with a new swagger and everybody forgave him his high hat.

Robert Muir, Rock Springs, was elected president of the association for the 1929-30 term. Charles Crofts, Rock Springs, was chosen vice-president; Andrew Hood, Superior, secretary; and A. H. Doane, Rock Springs, treasurer.

At the conclusion of the annual business meeting on the morning of July 20 the men formed in line for the parade, which brought them through the streets of the city to the Old Timers' Building, shown in the headpiece of the table of contents page in this issue of *Coal Age.* Bands recruited from among the miners, and their sons and daughters, kept time for cadenced feet and McAuliffe's own Scotch pipe band, grown from Jamie Noble, who walked and piped alone in 1924, to five pipers and four drummers, stirred the blood with the wild music of the tartaned North.

Halting before the Old Timers' Building, the leaders drew up in a square before old "Charlie Smith," Thomson-Houston mine locomotive placed in service in 1891 and retired only three years ago. As spokesman for the now silent "Charlie," John McTee, Jr., demanded that the electric mule's 34 years of service be given recognition. And Eugene McAuliffe, father of the Old Timers' Association and president of the Union Pacific Coal Co., agreed that the complaint was just and decorated "Charlie" with a badge and ribbons. "I'll see," he said, "that you have a reserved seat at every Old Timers' function from now on—a place in the sun before the Old Timers' Building."

Carroll B. Huntress, assistant to the executive secretary, National Coal Association, was the principal speaker at the annual banquet-luncheon held for the first time in the new building. In an address warm with feeling he paid fitting tribute to the spirit that had brought the organization into being and to the pioneers of the Rocky Mountain coal fields.

"Should the spirit manifest here today," he said, "be translated into all industry, there would be no such advertisements as one which I saw the other day, calling for a machinist and admonishing applicants that anyone over 35 years wouldn't be considered. Should the spirit manifest here today take firm root throughout the nation, there would be no more wailing and gnashing of teeth because of the scrapping of men beyond the meridian of life. Both industry and society suffer from that practice.

"Scrapping men is one thing; scrapping machinery is another. The former is anti-social, destructive. The latter makes for efficiency in industry, is thoroughly constructive. So long as the spirit which permeates your organization prevails there is nothing to fear from the increased use of machinery. It isn't the application of machinery that is to be feared. It's whether or not the organization back of it has a soul. The machines in these properties are useful servants. It isn't the machine which builds up or tears down spiritual values. It's the man or the system behind."

Following brief remarks by John P. White, former president, United Mine Workers, and W. M. Jeffers, vice-president in charge of operations, Union Pacific R.R., came the presentation of the gold buttons to the graduates into the 40-year class. The presentation was made by Mr. McAuliffe, and Mrs. McAuliffe placed the buttons in the lapels of the coats of the recipients. The new 40-year men are: Thomas Davis, John Armstrong, Sr., David V. Bell, Emil Berquist and Charles Crofts. Posthumous honors were paid to John Chokie and Charles A. Durham.

The Old Timers' Association was organized five years ago. Membership is open to any person in the employ of the company or related companies for twenty years. Retired and pensioned employees also are eligible. At present the association has a membership of 447 and embraces 29 nationalities. The oldest member in point of service is James Moon, retired trackman, who worked 53 years.

W. Va. Coal & Coke Co. Sold

Properties of the West Virginia Coal & Coke Co. were sold at auction at Omar, W. Va., July 9, to Leveritt F. Hooper, First National Bank of New York, representing a committee of bondholders. The purchase price was $1,-500,000 for the mortgaged properties and $560,000 for free assets, including coal contracts. The sale was confirmed by Judge McClintic, of the U. S. District Court, July 29, and the receivers discharged.

John C. Cosgrove, Johnstown, Pa., one of the three federal receivers, will remain as president of the company. Under reorganization plans, the name of the company will be changed to the West Virginia Coal & Coke Corporation and it will be capitalized at $2,400,000. Mr. Cosgrove stated that the rehabilitation of all operations is planned at a cost of $1,000,000.

Hanna Team, Winners of First Place In Men's First-Aid Contest

Left to right: Thomas Lucas, Arnum Bailie, W. E. Moffitt, John Fermelia, Charles Mellor, Ted Attryde (Captain); Below, T. H. Butler, Superintendent at Hanna.

Fewer Men, Greater Earnings At Mines in May

Employment in coal mining—anthracite and bituminous combined—decreased 1.2 per cent in May, 1929, as compared with April, while payroll totals increased 6.8 per cent, according to the monthly *Labor Review* of the United States Department of Labor. The 1,345 mines for which reports were received had 306,996 employees in May, whose combined earnings for one week were $8,015,157.

Employment in anthracite mines alone was 3 per cent greater in May, 1929, than in April, and payroll totals were 12.1 per cent higher. Employment in bituminous mines was 3.6 per cent lower than in April and payroll totals were 3 per cent higher. These figures are based upon reports from 1,183 mines in which there were in May 189,513 employees whose combined earnings in one week were $4,543,573.

There were decreases in employment in May in seven of the eight geographic divisions from which bituminous coal mining was reported, while only four of the eight showed decreased payroll totals. Certain states in the Middle Atlantic, East and West, North Central and South Atlantic divisions had greater demands in May, due to the development of the lake season, which largely increased their working time and resulted in decided increases in employees' earnings. Details are as follows:

Employment and Payroll Totals in Identical Bituminous Coal Mines In April and May, 1929

		Number on Payroll			Amount of Payroll		
	Mines	April, 1929	May, 1929	Per Cent Change	April, 1929	May, 1929	Per Cent Change
Middle Atlantic	360	62,817	60,804	— 3.2	$1,518,790	$1,517,215	+ 0.6
East North Central	174	31,391	29,048	— 7.5	663,614	714,846	+ 7.7
West North Central	55	4,681	4,378	— 6.5	96,992	98,511	+ 1.6
South Atlantic	262	43,271	42,977	— 0.7	925,007	1,019,226	+10.2
East South Central	220	41,914	40,778	— 2.7	842,277	841,294	— 0.1
West South Central	24	1,166	1,178	+ 1.0	22,694	21,837	— 3.8
Mountain	78	10,017	8,961	—10.5	290,946	278,315	— 4.3
Pacific	10	1,418	1,389	— 2.0	49,131	42,329	—13.8
All Divisions	1,183	196,675	189,513	— 3.6	$4,409,451	$4,543,573	+ 3.0

Per Cent Change in Each Line of Employment April to May, 1929

		Employment			Payroll in One Week		
	Establishments	April, 1929	May, 1929	Per Cent Change	April, 1929	May, 1929	Per Cent Change
Manufacturing	12,501	3,545,357	3,552,960	+ 0.1[1]	$99,629,414	$99,848,169	+ 0.2[1]
Coal Mining	1,345	310,738	306,996	— 1.2	7,506,561	8,015,157	+ 6.8
Anthracite	162	114,063	117,483	+ 3.0	3,095,110	3,471,584	+12.1
Bituminous	1,183	196,675	189,513	+ 3.6	4,409,451	4,543,573	+ 3.0
Metalliferous mining	339	59,267	59,404	+ 0.2	1,839,833	1,840,857	+ [2]
Public utilities	9,189	684,650	702,258	+ 2.6	20,353,570	20,768,351	+ 2.0
Trade	5,520	203,721	207,032	+ 1.6	5,097,951	5,157,520	+ 1.2
Wholesale	1,246	42,730	43,202	+ 1.1	1,281,078	1,293,898	+ 1.2
Retail	4,274	160,991	163,830	+ 1.8	3,816,872	3,861,822	+ 1.2
Hotels	1,800	146,403	143,998	— 1.6	2,492,460[3]	2,451,222[3]	— 1.7
Canning & preserving	280	33,735	23,052	—31.6	682,148	491,273	—28.0
Total	31,109	4,983,871	4,995,700	+ 0.2	$137,602,037	$138,571,849	+ 0.7

[1] Weighted per cent of change for the combined 54 manufacturing industries; the remaining per cents o change, including total, are unweighted. [2] Less than one-tenth of one per cent. [3] Cash payments only.

Obituary

GLENN H. DUKES, age 62, died at his home on Riverside Drive, north of Columbus, Ohio, July 28. Death was due to a cerebral hemorrhage following an illness of several months. Mr. Dukes joined the Sunday Creek Coal Co. in 1905 as chief engineer and held that position until his death. He also was a member of the American Society of Civil Engineers and was well known as a mining engineer in the southern Ohio coal field.

SAMUEL M. PERRY, vice-president, Denver Tramway Co., died in Denver, Colo., July 22, at the age of 80. Mr. Perry was a pioneer in the coal and utilities business in the West. His first utility enterprise was the electric traction line connecting Aurora, Colo., with Denver, which later was sold to the Denver Tramway Co. He also organized the Moffat Coal Co., the Leyden Co., and was interested in the Oak Hills Coal Co.

C. C. WILCOX, age 37, vice-president and general manager of the St. Louis & O'Fallon Coal Co., died in St. Elizabeth's hospital, Belleville, Ill., Aug. 4. Mr. Wilcox was connected with the O'Fallon company for 14 years and on the death of his father several years ago became vice-president and general manager.

J. C. WILLIAMS, formerly connected with the Rocky Mountain Fuel Co. as manager of the Louisville district and later engaged in developing other coal properties, died at his home in Louisville, Colo., July 20.

MIKE MCNAMARA, superintendent of the Peabody No. 3 mine of the Peabody Coal Co., died at the age of 57 at the Anna (Ill.) State Hospital, following a nervous breakdown.

King Coal's Calendar for July

July 3—William B. Wilson, of Pennsylvania, Secretary of Labor under President Wilson, jointly elected as arbitrator by the Illinois Coal Operators' Labor Association and District No. 12, United Mine Workers, under terms of contract providing for the election of one man to adjust disputes.

July 6—Sipsey team, DeBardeleben Coal Corporation, wins Eleventh Annual Alabama First-Aid Contest, held in Birmingham.

July 9—Properties of the West Virginia Coal & Coke Co., located in West Virginia, purchased by L. F. Hooper, First National Bank of New York, representing the bondholders' committee, for $1,500,000. Berkely Minor, Jr., Charleston, W. Va., and Samuel F. Spears, of Elkins, were special commissioners who conducted the sale at Omar, W. Va., under authority of the federal court. Mr. Hooper was the only bidder. The sale later was confirmed by the court.

July 11—A conference of coal operators and expert economists to discuss remedies for the present ills threatening disaster to the coal industry suggested to President Hoover by Representative Frank L. Bowman, of West Virginia.

July 11—Seventy-three union coal miners file individual suits against the Knox County Fourth Vein Coal Co., Edwardsport, Ind., for $10,000 each for alleged breach of contract in reopening its mine at a wage scale other than that provided in the contract with the union.

July 11—Ciotti Querino, alias Sam Ciotti, who confessed to his part in the attempt to dynamite the mines of the Consolidation Coal Co., near Monongah, W. Va., receives $2,000 as his share of a reward of $5,000 offered for the arrest and conviction of the guilty persons.

July 18—L. O. Chasey, secretary to Governor Harry G. Leslie of Indiana, elected chairman of the executive bureau of the Indiana Coal Bureau, whose business is the boosting of Indiana-mined coal for Indiana use.

July 20—Bondholders' protective committee of the Soper-Mitchell Coal Co. purchase the entire holdings of the company, operating mines in the Scotts Run district of West Virginia, for $25,000.

July 20—Virginia Coal Operators' Association adopts trade-practice code.

July 22—Five thousand miners return to work when the Lehigh Valley Coal Corporation announces resumption of operations at its collieries in the vicinity of Wilkes-Barre, Pa.

July 22—The mine of the Bono Mining Co., near Dana, Ind., closed recently after an attack on the workers by a mob of 600 men, reopened with a full working force. Fifty-seven stockholder-owners operate the mine.

July 23—Industrial Power Corporation organized under the laws of Delaware for the processing of coal and the furnishing of electric power, gas and steam to the manufacturing and stockyard district of Chicago, including Packingtown, and the entire industrial area adjacent.

July 26—Anthracite Workers of Pennsylvania, a dual miners' organization favoring severance of the anthracite fields from the bituminous, turns over its charter to District No. 1, United Mine Workers, and terminates its existence.

July 27—Acceding to the suggestion of the conciliation board, the sub-district executive board of the United Mine Workers calls off the strike of 7,000 mine workers of the Lehigh Coal & Navigation Co., and agrees to confer with company officials on an equalization of working time.

July 30—Twenty-three miners killed and twelve seriously injured in an explosion in the Friedenhoffnung mine, near Neiderhernsdorff, Lower Silesia.

Soper-Mitchell Co. Sold

The bondholders' protective committee purchased the holdings of the Soper-Mitchell Coal Co., operating mines in the Scotts Run District of West Virginia, for $25,000 at a public auction held at Morgantown, W. Va., July 20.

The Apex Coal Co. property, near Jewett, Ohio, consisting of several operating mines was recently sold at public auction by D. A. Elkin, receiver, for $38,000.

Miners' Tonnage Improves

Coal miners in the employ of the Rocky Mountain Fuel Co., Denver, Colo., produced 1.02 tons more per man per day during the first six months of 1929 than in the corresponding period last year, according to a report to the Colorado Industrial Commission by Merle D. Vincent, president and general manager of the company. This production, which includes both outside and inside employees, was attributed by Mr. Vincent to the harmony existing between the employees and the operators, as well as the $7 per day base wage inaugurated in April, 1929. At that time, the United Mine Workers was recognized by the Rocky Mountain company, the only one in Colorado to take this step.

The report was submitted to give the Industrial Commission an opportunity to study the results of the April working contract. The company stated that the average daily wage at its properties was as follows: Columbine, $8.09; Grant, $8.57; Industrial, $7.91; Vulcan, $6.89; Alpine, $7.29, and Standard, $8.44.

Bagged-Coal Delivery To Be Pushed

Sales of buckwheat coal in bags is to be pushed as the result of studies proposed by the Cotton-Textile Institute in co-operation with F. M. Feiker, managing director of the Associated Business Papers. Experiments have been made with bags manufactured from osnaburg, the fabric used in cement bags, with particular reference to packaging for delivery to domestic stoker equipment. The capacity of the bag is 30 to 40 lb.

This capacity-range was adopted to make the coal easy to handle in the home cellar without unnecessary strain. Other advantages of this type of delivery include dust elimination when the coal is put in and elimination of shoveling, as the contents of the bag are dumped into the stoker hopper. Under the plan of sale suggested the retail dealer would contract to take care of the fuel requirements of the consumer, calling periodically to make bag delivery of branded coal and collecting the empty containers.

The desirability of exploring the possibilities of packaged delivery was suggested in an editorial in the June, 1928, issue of *Coal Age*.

Stuart, James & Cooke, Inc., New York, have formed an association with Berwick, Moreing & Co., London, according to a recent announcement. James H. Pierce will hereafter make his headquarters with Berwick, Moreing & Co., as the London partner of Stuart, James & Cooke, Inc. Dr. Adolph Krummer, consulting engineer, Berlin, Germany, for some years associated with the Deutsche Bank and in charge of western German metal mines during the war, has joined the firm in the capacity of an associate, as has also Wallace Clark, management and production expert, of Warsaw and Paris.

The United States Distributing Corporation recently acquired an interest in the Shanferoke Coal & Supply Corporation of Delaware. The Shanferoke company will continue to sell only Hudson Coal Co.'s D. & H. Lackawanna anthracite and be operated by the same executives and sales organization as formerly.

Orders have been issued by the City Planning Commission and the Board of Health of Atlantic City, N. J., that "the use of bituminous coal and oil in heating plants" must cease and anthracite be used exclusively. The reason for the order is the "dirt and soot caused by the use of the two prohibited fuels."

Coming Meetings

Pocahontas District Safety Meet; Aug. 17, Welch, W. Va.

Logan County Safety Meet; Aug. 18, Logan, W. Va.

Annual First-Aid Meet of the Harlan County Coal Operators' Association; Aug. 24, Harlan, Ky.

Eleventh Annual Virginia State-Wide First-Aid Meet; Aug. 24, Norton, Va.

Twelfth Annual Meeting on "Human Relations in Industry," under auspices of the Industrial Department, National Council, Young Men's Christian Association; Aug. 28-Sept. 1, at Silver Bay on Lake George, N. Y.

Oklahoma Coal Operators' Association; annual meeting, Sept. 3, at McAlester, Okla.

Fourth Annual West Virginia Safety Day; Sept. 6 and 7, Laidley Field, Charleston, W. Va.

Fall Meeting, American Welding Society; Sept. 9-13, Hotel Statler and Public Auditorium, Cleveland, Ohio.

Eighth International First Aid and Mine Rescue Contest, sponsored by U. S. Bureau of Mines; Sept. 12-14, at Kansas City, Mo.

National Safety Council; annual congress of the Mining Section, Sept. 30 to Oct. 4, at Chicago, with headquarters at Stevens Hotel.

World Engineering Conference, October, 1929, at Tokyo, Japan.

Fuels Division, American Society of Mechanical Engineers; third national meeting, Oct. 7-10 at Philadelphia, Pa.

The Canadian Institute of Mining and Metallurgy; annual Western meeting Oct. 9-11, at Edmonton, Alberta, Canada.

National Coal Association; twelfth annual meeting, Oct. 23-25, at Sinton Hotel, Cincinnati, Ohio.

September Date Chosen For W. Va. Meet

Ceremonies connected with the observance of the Fourth Annual Safety Day in West Virginia will be held at Laidley Field, Charleston, W. Va., Sept. 6 and 7. Features scheduled for the first day are a meeting of the National Mine Rescue Association and a mine-rescue contest between crews which have seen actual service in disasters. Winning teams in the various district first-aid and mine safety contests will compete on the second day.

Britain Shows Profit

For the first time since the first quarter of 1927 the British coal industry shows a profit. According to Philip Gee, spokesman for the producers, the profit during the first quarter of 1929 averaged 16.5c. per short ton, as compared to a loss of 11.39c. during the 27 months ended March 31, 1929.

Coal Men Appointed

George J. Anderson, president, Consolidation Coal Co., New York, and W. M. Wiley, vice-president, Boone County Coal Corporation, Sharples, W. Va., recently were appointed to a committee of the Chamber of Commerce of the United States to serve with the two directors of the natural resources production department.

Personal Notes

C. B. Cardy, president J. K. Dering Coal Co., Chicago, recently resigned to resume active practice of law.

J. D. Martin, general superintendent of coal mines until the abolishment of that office, has been appointed chief engineer of the Virginia Iron, Coal & Coke Co., with headquarters at Toms Creek.

Lewis C. Lewis has been appointed to the office of mine safety engineer with offices in Columbus, Ohio. This action follows the extension of the service of the Division of Safety and Hygiene of the Ohio Industrial Commission to include the mining industry.

F. Earl Kraitzburg, formerly chief clerk, operating department, has been promoted to personnel manager of the Maryland division of the Consolidation Coal Co.

George W. Crawford, president, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., has been invited to serve on the advisory committee of the Census of Manufactures.

Henry Rees Owens, Wilkes-Barre, Pa., and Frank B. McGovern, Scranton, have been appointed anthracite mine inspectors by Governor Fisher of Pennsylvania.

John V. Hunter, Sunlet, and Thomas H. Butler, Hanna, were recently appointed members of the Wyoming state coal mining examining board by Governor Emerson.

Coal Mine Fatalities in June Increase Over Number in Previous Month

ACCIDENTS at coal mines in the United States during the month of June, 1929, caused the death of 147 men, according to information furnished by state mine inspectors to the U. S. Bureau of Mines. Thirty-two of this number were killed in the anthracite mines of Pennsylvania; the remaining 115 deaths occurred in bituminous mines in various states. The death rate per million tons of coal produced during the month was 3.42, based on a production of 42,969,000 tons of coal, as compared with 3.61 for June, 1928, based on 149 deaths and an output of 41,264,000 tons of coal.

The rate of bituminous mines alone for June, 1929, was 3.03, with a production of 37,900,000 tons, and that for anthracite mines was 6.31 with a tonnage of 5,069,000, as compared with 3.14 and 6.79, respectively, for June of last year, based on an output of 35,963,000 tons and 113 deaths, and 5,301,000 tons and 36 deaths. Compared with May, 1929, the rate for June of the present year was slightly higher for the industry as a whole and for both bituminous and anthracite separately.

Reports for the first six months of 1929 showed that accidents at coal mines caused the loss of 985 lives as compared with 1,172 for the same period of 1928. The production of coal thus far in 1929 is 289,903,000 tons, showing a fatality rate of 3.40; that for the period January to June, 1928, was 271,392,000 tons, with a fatality rate of 4.32. Thus it will be seen that the present year has a better record both as to number of fatalities and production.

On June 5 a fall of slate, which killed 5 men, occurred at Bear Creek, Va. This major disaster—that is, one causing the loss of 5 or more lives—brings the number of such accidents for the first six months of 1929 up to 4 with resulting loss of 75 lives. There were 9 major disasters in the same period of 1928, with a loss of 290 lives. The death rates per million tons of coal produced, based exclusively on these disasters, were 0.26 and 1.07, respectively, for the first half of 1929 and 1928.

Comparing the accident records for the period January to June, 1929, with the same months of 1928, a reduction is noted in the death rates for falls of roof and coal, gas or dust explosions, explosives, and electricity, while a slight increase is shown for haulage. The comparative fatality rates in the various classes of accidents for the corresponding periods of 1929 and 1928 are as follows:

	Year 1928	Jan.-June 1928	Jan.-June 1929
All causes	3.812	4.318	3.398
Falls of roof and coal	1.868	1.879	1.811
Haulage	.632	.597	.659
Gas or dust explosions:			
Local explosions	.088	.107	.076
Major explosions	.572	1.069	.238
Explosives	.130	.162	.145
Electricity	.155	.147	.117
Other causes	.367	.357	.352

Illinois Deaths Least In Year 1929

Fatalities in the coal mines of Illinois dropped to a new low in the first six months of 1929, according to A. D. Lewis, director, State Department of Mines and Minerals. Since Jan. 1, 28,364,854 tons of coal has been mined with 43 deaths. This is at a rate of 659,648 tons per fatality, the lowest figure in the history of Illinois coal mining for a like period. The rate during the first six months of 1928 was 405,925 tons per man killed. The Department of Mines and Minerals has asked the operators to continue the support and co-operation in first-aid and mine-rescue training and careful management of property and men which resulted in the present record.

Kentucky to Hold State-Wide First-Aid Meet

The Kentucky State-Wide First-Aid Contest will be held at the stadium of the University of Kentucky, Lexington, Ky., Aug. 31, under the auspices of the State Department of Mines. Two preliminary contests will also take place in the month of August. The first will be held Aug. 10, at Pikeville, teams from all the companies in Pike, Floyd, Johnson, Knott and Magoffin counties participating. Teams from various companies in Harlan County will compete in a meet Aug. 17 at Harlan.

Coal-Mine Fatalities During June, 1929, 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	1929	1928
Alabama	1	1	...	...	...	...	...	...	...	...	...	2	1	...	...	...	1	...	...	...	...	...	...	...	3	6
Arkansas	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	2
Colorado	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	4
Illinois	4	2	1	...	1	...	...	...	...	...	...	8	...	...	2	...	2	...	...	...	...	...	...	...	10	4
Indiana	3	...	...	...	...	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	3	0
Iowa	1	...	1	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	2	0
Kansas	1	...	...	...	...	...	1	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	2	2
Kentucky	9	...	3	...	...	...	2	...	...	...	1	15	...	...	...	...	...	...	...	...	...	...	1	1	16	10
Maryland	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0	1
Michigan	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0	0
Missouri	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0	1
Montana	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0	1
New Mexico	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	0
North Dakota	...	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	1
Ohio	2	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	1	1	3	8
Oklahoma	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	0
Pennsylvania (bituminous)	15	3	2	...	1	...	...	...	...	...	...	21	...	...	...	...	...	1	...	...	...	...	...	1	22	21
Tennessee	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0	0
Texas	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0	1
Utah	2	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	2	0
Virginia	1	5	...	...	...	...	...	...	...	...	...	6	...	...	...	...	...	...	...	...	...	...	...	...	6	4
Washington	...	...	...	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	1
West Virginia	12	5	9	4	1	...	1	...	1	...	...	33	1	...	...	...	1	1	1	...	...	...	1	3	37	44
Wyoming	2	...	1	...	...	...	...	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	3	2
Total (bituminous)	53	17	19	4	4	...	6	...	1	...	1	105	2	...	2	...	4	2	1	...	...	...	3	6	115	113
Pennsylvania (anthracite)	15	2	2	...	6	...	...	...	...	...	1	26	2	...	...	...	2	1	1	...	...	...	2	4	32	36
Total, June, 1929	68	19	21	4	10	...	6	...	1	...	2	131	4	...	2	...	6	3	2	...	...	...	5	10	147	...
Total, June, 1928	69	15	30	11	7	1	7	...	...	...	4	144	1	...	...	...	1	1	...	...	...	1	2	4	......	149

Among the Manufacturers

CONTROLLING interests in the Union Steel Casting Co., Lewis Foundry & Machine Co., and National Alloy Steel Co., all in the Pittsburgh industrial district, recently were acquired by the Blaw-Knox Co., Pittsburgh, Pa.

* * *

J. M. BEGGS, formerly with the sales department, has been placed in charge of the advertising department of the Van Dorn Electric Tool Co., Cleveland, Ohio. R. W. Proctor, Black & Decker Mfg. Co., recently was appointed general sales manager.

* * *

ELVERITE is the new trade name of the chilled-iron products of the Fuller Lehigh Co., Fullerton, Pa.

* * *

THE YALE & TOWNE MFG. CO., Stamford, Conn., has purchased the assets and good will of the Stuebing Cowan Co., Cincinnati, Ohio, and Mt. Holyoke, Mass., thus adding a line of single and multiple-lift hand trucks to its other material-handling devices.

* * *

F. A. MERRICK recently was elected the fourth president of the Westinghouse Electric & Mfg. Co. since its organization in 1886.

* * *

THE AMERICAN HOIST & DERRICK Co., St. Paul, Minn., has removed its California office to 5515 Doyle Ave., Emeryville, Oakland.

* * *

THE PREST-O-LITE CO., INC., has installed new acetylene gas plants at Wichita, Kan., and Youngstown, Ohio.

* * *

TWELVE leading manufacturers of Diesel engines in the United States have formed the Diesel Engine Manufacturers' Association, with offices at 30 Church St., New York.

* * *

HAROLD S. FALK, vice-president and works manager of the Falk Corporation, Milwaukee, Wis., has been appointed chairman of the committee on industrial education of the National Metal Trades Association.

* * *

THE WAGNER ELECTRIC CORPORATION, St. Louis, Mo., announces the addition of W. H. Kretz to its transformer sales division. Mr. Kretz will travel in the Southwest.

CHARLES E. EVELETH, General Electric Co., has been transferred to the engineering department and, as vice-president, will give special attention to the designing departments and works laboratories.

* * *

THE OHIO BRASS CO., Mansfield, Ohio, has opened an office at 505 Insurance Building, Dallas, Texas.

* * *

THE AMERICAN ROLLING MILL CO., Middletown, Ohio, announces the placing of an order by the Pennsylvania R.R. for 1,000 all-metal box cars to be manufactured of pure iron sheets. These will be rolled in the new continuous mills of the company.

* * *

WARREN C. WEBB, formerly Chicago sales manager, has been appointed Pacific Coast sales manager of the W. A. Jones Foundry & Machine Co., with offices at Los Angeles, Calif. Walter M. Sutton has been appointed manager of the Pittsburgh (Pa.) office.

Trade Literature

Power at the Touch of a Button. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. Pp. 7; illustrated. Describes the linestarter principle, which permits motor control at the push of a button, and the linestart motor, which may be started across the line without the use of the linestarter if high starting current is not objectionable. The same company also recently issued the following bulletins: Leaflet 20,421, Multiple Operator Arc Welding Equipment, describing the application, distinctive features and general principles of construction; Leaflet 20,406, describing the application, operation and construction of Class 11-400 Magnetic Resistance Type Starter for Squirrel-Cage Induction Motors; Leaflet 1661-D, covering the application, distinctive features and operation of Class 13-125 and Class 13,225 Magnetic Starters for Wound Rotor Induction Motors. These leaflets are all illustrated.

"Rolled Zinc" is the title of a booklet issued by the New Jersey Zinc Co., New York City. Among the zinc products described are roofing and siding. Pp. 44; illustrated.

American-LaFrance & Foamite Corporation, Utica, N. Y., has issued a folder entitled First-Aid Attack, which describes in detail two types of Foamite chemical tanks for motor fire apparatus installation.

Link-Belt Co., Chicago, has issued an illustrated 48-pp. book, No. 1095 describing its complete line of gasoline, Diesel, electric and steam operated cranes, shovels and draglines.

C-E Water Level Indicator. Combustion Engineering Corporation, New York City. Four-page folder, illustrating and describing its location for easy reading and how it operates in cold water circuit.

Hazleton Diaphragm Switch. Barrett, Haentjens & Co., Hazleton, Pa., Bulletin 903. How this portable switch is used to start and stop pumps, or to control indicator circuits, according to the water levels in sump, tanks, pits, etc., is described in this illustrated four-page bulletin.

"Calyx" Drills. Ingersoll-Rand Co., New York City. Form No. 9401; 43 pp., illustrated. Describes the various uses of these drills, including core-drill work. Specifications, capacities and essential details of the various sizes also are included.

Triple-A Compressors and Exhausters. Allen Air Appliance Co., New York City. Bulletin No. A-50; 11 pp., illustrated. Describes among the other applications of the Triple A centrifugal blowers their use in mine ventilation, flotation, combustion, etc.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has issued Leaflet 20,388 illustrating and describing its Class 12-700, Type A reversing drum controllers for wound-rotor induction motors, and Circular 1834 entitled Synchronous Visual Supervisory Control, 12 pp., illustrating and describing the application, advantages and system of operation of the present types of Westinghouse supervisory control units.

The Uehling Instrument Co., Paterson, N. J., has published a 6-p. bulletin No. 150, illustrating and describing the Uehling Barometer and Vacuum Recorder for Steam Turbines.

Catalog No. 90-A, issued by the South Bend Lathe Works, South Bend, Ind., contains illustrations, descriptions and prices of its entire line of lathes from 9-in. to 18-in. size; included is a section devoted to the 18-in. new model silent-chain motor-driven lathe.

Vertical Gas Engines, Type RHG 75. Chicago Pneumatic Tool Co., Chicago, Ill. Bulletin 782. Pp. 15; illustrated. Includes general description with details of construction.

Air-Jacketed Motors. Wagner Electric Corporation, St. Louis, Mo. Third revision. Bulletin 151; 6-pp. folder containing a discussion of dust, fume and moisture problems requiring special protection for motor and property.

The Sullivan Roller Sharpener for Coal Cutter Bits. Sullivan Machinery Co., Chicago, Ill. Bulletin No. 72-M. Pp. 15; illustrated. Describes the performance and advantages of this sharpener. A description of the Automatic Bit Heater, recommended for use with the sharpener, is included.

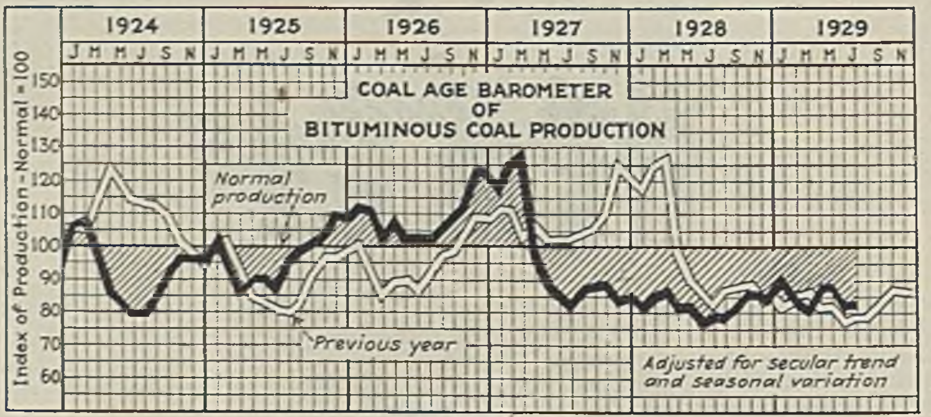
Roller-Smith Co., New York City, recently issued Bulletin No. 600, Oil Circuit Breakers—Indoor Type, 19 pp., and Supplement No. 1 to Bulletin No. 400, Type FD (4") Pyrometers, 4-pp. folder. Both are illustrated.

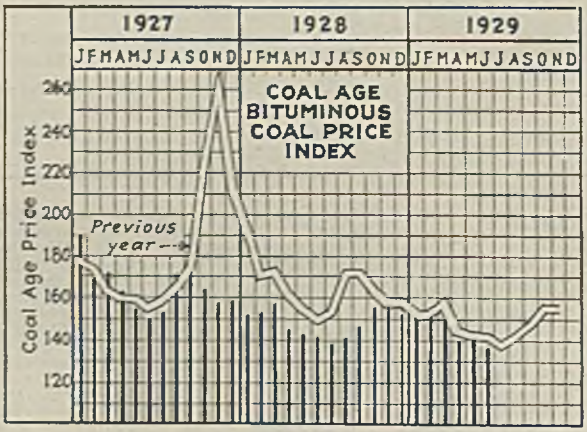
Centrifugal Acid Pumps (Chemical Stoneware Lined). The U. S. Stoneware Co., New York City. Bulletin D. Pp. 8, illustrating and describing applications, construction and specifications. Instructions for applying the characteristic performance curves to any required pump conditions are also included.

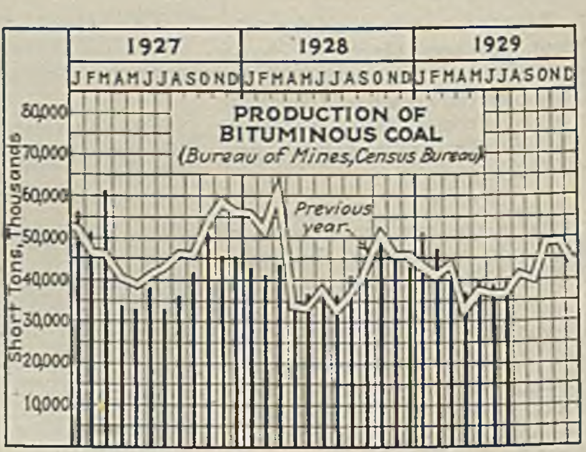
Hercules Powder Co., Wilmington, Del., has issued the following two bulletins: Hercoal-F—A New Type Explosive, containing 13 pp. illustrating and describing this new explosive, its safety feature, comparison of costs, etc. Hercoal-C—Lump Producing Permissible Explosive, 4-pp. folder.

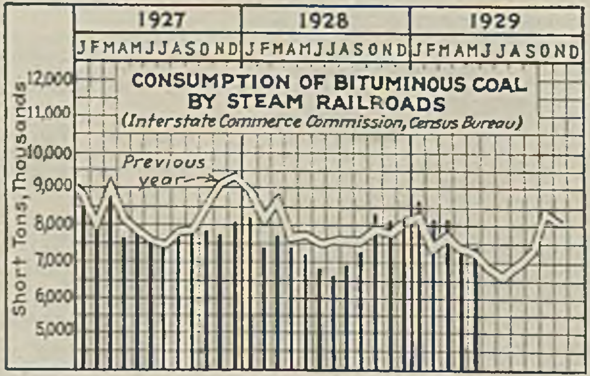
E. I. du Pont de Nemours & Co., Inc., explosives department, Wilmington, Del., has issued the following two bulletins: Best Practices in the Handling and Use of Pellet Powder, by F. T. Luscher. Auxiliary Ventilation—A Venturi blower that can be made cheaply in the mine machine shop, by C. F. Raney. These are both 4-pp. folders.

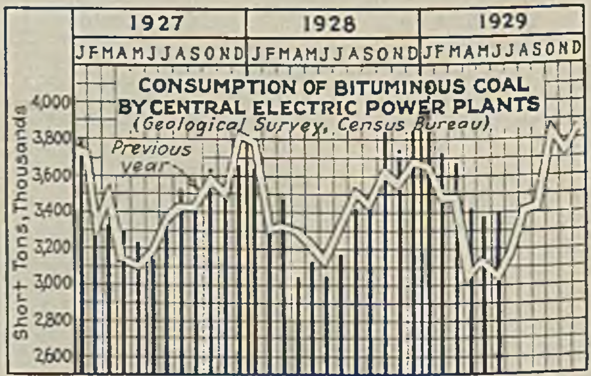
Indicators of Activities in the Coal Industry

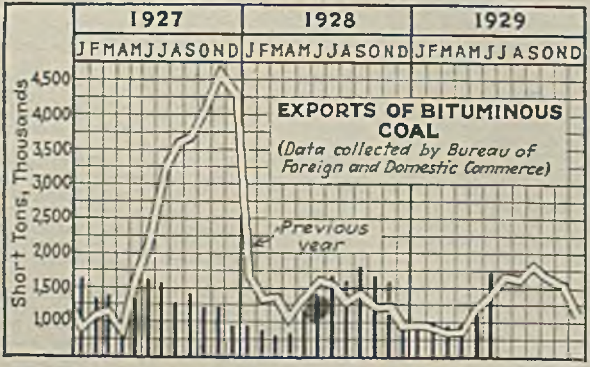


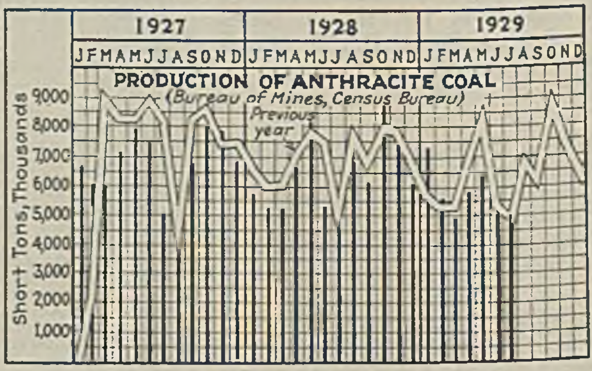












MARKETS *in Review*

SIGNS of acceleration, fostered by a slight improvement in demand, were visible in the coal industry of the country in July. Prices remained firm but buying for storage, as a rule, was still conspicuous by its absence. However, decreased coal stocks and continued industrial activity are expected to result in a fall rush that may tax the capacity of dealers and railroads. The American Railway Association points out that an increased demand for open-top cars for the loading of coal is expected in the fall, and this, coupled with the continued requests for this type of car for shipping other commodities, probably will eliminate the present surplus and necessitate the active use of the entire supply.

July production is estimated by the United States Bureau of Mines at 40,619,000 net tons, an increase of 2,546,000 tons over June and 4,343,000 tons over July of last year. Prices increased somewhat at the first of the month but receded at the last, the general level remaining substantially as in June, in spite of the increase in production.

Coal Age Index of spot bituminous prices was 140 on July 6; 138, July 13; 136, July 20, and 137, July 27. The corresponding weighted average prices were $1.70, July 6; $1.67, July 13; $1.65, July 20, and $1.66, July 27. These are preliminary figures. Revised figures for June were 139, June 1; 137, June 8; 139, June 15; 136, June 22, and 139, June 29. The corresponding weighted average prices are $1.68, June 1; $1.66, June 8; $1.68, June 15; $1.65, June 22, and $1.68, June 29. The monthly Index for June was 138, as compared to the unrevised figure of 137¾ for July.

Shipments to the lakes continued throughout the month at a slightly higher rate than for the corresponding period last year. Dumpings at the lower lake ports for the season to July 29 were 18,603,893 net tons, an increase of 3,873,921 tons over the corresponding period in 1928. Cargo dumpings to July 29 were 17,918,557 tons and bunker fuel loadings were 684,336 tons.

Anthracite demand in July picked up slightly at the end of the month, with the exception of buckwheat, which developed a run in the New York market. Operators are still concerned about the failure of dealers to replenish their stocks, in spite of the approach of fall and increasing prices. An optimistic tone prevailed, however, and buying is expected to increase in August and September. Price advances of 10c. per ton were scheduled for Aug. 1 in all the principal markets.

DOMESTIC demand in the Chicago market improved slightly in the month of July. However, it is still six to eight weeks behind that of last year and threatens to generate a fall rush which will tax dealers in September and October. Small householders have bought, but the big business is still to come in—outside as well as in the city. Higher prices announced for Aug. 1 were expected to bring in orders, but the increase in most cases was below expectations. Demand was best on smokeless coals and the better grades of Eastern high-volatiles. Retailers refused to be interested because of the persistent refusal of the public to buy and both were apparently unmoved by the prospect of price advances.

Price advances, effective Aug. 1, are as follows; Illinois lump, 25c.; smokeless lump, egg, mine-run and ordinary grades of Eastern high-volatiles, 25c.; premium grades, Eastern high-volatiles, 35c. Coke will be 25c. and anthracite 10c. higher than the July lists. Good supplies of coke have been laid in but the stocks of bituminous and anthracite coals are light.

ANTICIPATION of easier prices on screenings as a result of improvement in domestic sizes held up steam buying during the month. Shipments on contracts were fairly heavy but no coal was taken for storage purposes. Second-grade screenings from Illinois, Indiana and western Kentucky could be had in some instances at 75c. Western Kentucky screenings were slow at 60c.@70c. Southern Illinois screenings were offered at $1.65@$1.75, though some companies acting independently asked $1.25@$1.35 in carload lots. Indiana and western Kentucky mine-run was easy at $1 up for the former and 85c. up for the latter.

The St. Louis coal market was unusually quiet in July and no demand for either steam or domestic sizes developed. The steam market showed no indication of improving and domestic consumers still disregarded price allowances and failed to lay in supplies. Continued refusal to lay in stocks leads to the belief that a heavy movement will take place later. August prices are as follows: Mt. Olive lump and egg, $2.50; nut, $1.85@$2; mine-run, $2; screenings, $1.15@$1.25; Standard lump and egg, $1.85@$2.10; nut, $1.60@$1.85; mine-run, $1.60; screenings, 80c.@90c.; DuQuoin district lump, $2.50@$2.60; nut, $2.25@$2.35; mine-run, $2, and screenings, $1.50.

Shipments from the docks at the

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

		Week Ended							
		July 6, 1929		July 13, 1929		July 20, 1929		July 27, 1929	
	Market Quoted	Independent	Company	Independent	Company	Independent	Company	Independent	Company
Broken	New York	....	$8.00@$8.20	....	$8.00@$8.20	....	$8.00@$8.20	....	$8.00@$8.20
Broken	Philadelphia	$8.20@$8.30	8.20	$8.20@$8.30	8.20	$8.20@$8.30	8.20	$8.00@$8.30	8.20
Egg	New York	8.15@ 8.40	8.40	8.15@ 8.40	8.40	8.15@ 8.40	8.40	8.15@ 8.40	8.40
Egg	Philadelphia	8.40@ 8.65	8.40	8.40@ 8.65	8.40	8.40@ 8.65	8.40	8.40@ 8.65	8.40
Egg	Chicago*	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50
Stove	New York	8.65@ 8.90	8.90	8.65@ 8.90	8.90	8.65@ 8.90	8.90	8.65@ 8.90	8.90
Stove	Philadelphia	8.90@ 9.15	8.90	8.90@ 9.15	8.90	8.90@ 9.15	8.90	8.90@ 9.15	8.90
Stove	Chicago*	7.95	7.95	7.95	7.95	7.95	7.95	7.95	7.95
Chestnut	New York	8.15@ 8.40	8.40	8.15@ 8.40	8.40	8.15@ 8.40	8.40	8.15@ 8.40	8.40
Chestnut	Philadelphia	8.40@ 8.65	8.40	8.40@ 8.65	8.40	8.40@ 8.65	8.40	8.40@ 8.65	8.40
Chestnut	Chicago*	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50
Pea	New York	4.25@ 4.70	4.70	4.25@ 4.70	4.70	4.25@ 4.70	4.70	4.25@ 4.70	4.70
Pea	Philadelphia	4.70@ 4.95	4.70	4.70@ 4.95	4.70	4.70@ 4.95	4.70	4.70@ 4.95	4.70
Pea	Chicago*	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20
Buckwheat	New York	2.50@ 2.75	†2.75	2.50@ 2.75	†2.75	2.50@ 2.75	†2.75	2.65@ 2.75	†2.75
Buckwheat	Philadelphia	2.75@ 3.00	2.75	2.75@ 3.00	2.75	2.75@ 3.00	2.75	2.75@ 3.00	2.75
Rice	New York	1.65@ 1.85	2.00	1.65@ 1.85	2.00	1.65@ 1.85	2.00	1.65@ 1.85	2.00
Rice	Philadelphia	2.00@ 2.25	2.00	2.00@ 2.25	2.00	2.00@ 2.25	2.00	2.00@ 2.25	2.00
Barley	New York	1.40@ 1.50	1.50	1.40@ 1.50	1.50	1.40@ 1.50	1.50	1.40@ 1.50	1.50
Barley	Philadelphia	1.50@ 1.60	1.50	1.50@ 1.60	1.50	1.50@ 1.60	1.50	1.50@ 1.60	1.50

*Net tons, f.o.b. mines. †Domestic buckwheat, $3.25 (D. L. & W.)

Head of the Lakes were light during the month of July. The official statement is expected to show an aggregate of 12,585 cars as compared to 14,036 in June. Extremely hot weather slowed down industrial operations and the iron mining companies bought only limited supplies. Retailers, as a result of tight credit, showed no disposition to stock until September, though an improved industrial demand is expected in August. Shipments moved freely from the Lake Erie ports and the aggregate coal, coke and anthracite tonnage is expected to be 1,600,000 as compared to 1,781,881 in June. Total receipts to July 1 were reported to be 4,435,087 tons, an increase of 1,472,878 tons over the same period last year. Anthracite shipments to July 1 were 242,555 tons, a gain of 90,373 tons over last year. Pocahontas and other smokeless coals were in better demand and dock operators, with rail and lake rates at present levels, expect to get a good share of the business.

Bituminous coals were firm throughout the month and dealers report that their regular seasonal contracts have been closed. Prices were strictly adhered to in bidding for competitive tonnages. Prices for July were as follow: Pocahontas lump, egg, stove and nut, $7.65; mine-run, $5.40; screenings, $4.10; Kentucky block and lump, $6.50; egg and stove, $5.65; egg and dock-run, $5.60, stove, $5.55; dock-run, $5.50, screenings, $4.10; splint block, $5.75; lump and egg, $5.50; dock-run, $4.75; screenings, $3.85; Youghiogheny block, lump and egg, $5.25; stove, $5; dock-run, $4.50; screenings, $3.85; Hocking block, $5.50; lump, $5.25; stove, $5; dock-run, $4.50; screenings, $3.60; anthracite stove, $13; egg and nut, $12.60; pea, $9, and buckwheat, $7.75.

July sales in the Southwest were slightly better than in June, which was the poorest month in the year. Storage sales are starting later than usual, and threshing coal, formerly an important item, dwindled to negligible proportions. Orders for school use, however, were fairly numerous. Kansas prices remained unchanged, though the other fields made the usual advances on the summer storage schedule. July prices were as follows: McAlester (Okla.) lump, $6.25; Wilburton (Okla.) lump, $5.50; Henryetta (Okla.) lump, $3.75@$4; Arkansas semi-anthracite, $4.50; Paris (Ark.) lump, $5.25; Spadra (Ark.) anthracite grate, furnace, egg and range, $5.75, and Bernice (Ark.) grate, $6.75.

Sluggish buying, with a consequent increase in "no bills" to 500 cars, featured the Colorado market in July. Mine running time decreased slightly to 55 per cent. Steam demand was good but that for prepared sizes was stagnant. New prices, effective Aug. 1, are as follows; Walsenburg-Canon City lump, $5; nut, $4.30; washed chestnut, $3.25; Trinidad coking lump, nut and chestnut, $3.15; Crested Butte bituminous lump, $5; nut, $4.30; Crested Butte anthracite egg and furnace, $8; Rock Springs-Kemmerer lump, $4; nut, $3.75; steam sizes, $1.50; Colorado steam sizes, $1.40.

The Louisville market, though quiet, improved slightly in July, but scheduled price advances are still being held in abeyance. Early stocking for domestic use was good, though the total over June and July was light, reflecting the attitude of the retailers. Eastern Kentucky reported a better movement to Chicago and beyond, and coarse coals sold well at $2. Harlan operators have been trying to obtain $2.25, though there has been some shading. They also plan to advance prices 10c. on Aug. 1. Lake business was under the normal quota, only captive mines enjoying good running time. Western Kentucky mines reported a fair movement to the Northwest, but retailers in the Middle West and Southern territory have been lax in buying. Steam movement was good and screenings were kept out of the way at fair prices.

Western Kentucky prices were as follows; mine-run, 85c. up; prepared sizes, other than premium coals, $1.15 for small nut to $1.50 for 6-in. block; screenings, 65c. up. Prices for mine-run in eastern Kentucky were $1.25 up; lump, egg and nut, $1.50@$1.75; 6-in. block, $1,75@$2.25, and screenings, $1.25 up. Some low-grade screenings were sold for as low as 45c.

Producers in the Cincinnati market found the lake trade highly satisfactory in the month of July though it was of little benefit to the wholesalers. Kentucky and West Virginia production moving through the Cincinnati gateway gained each week throughout the month over the corresponding period last year. Indifference on the part of the retail buyers and the country trade was the principal adverse factor throughout the month, though quite a little tonnage went into householders' cellars under the stimulus of price advance. However, retail buying and household deliveries are said to be from 25 to 50 per cent below normal for the year.

Prices were on the upturn throughout the month, with the exception of mine-run, which remained at its former level, and a clear advance of 25c. in the circular price of smokeless sizes was scheduled for Aug. 1. Prices during the month of July were as follows: smokeless lump, $7.75@$8; mine-run, $5.75@$6; bituminous lump, $6@$6.25; screenings, $4.25@$4.50.

With domestic demand showing greater momentum and a slight increase in interest in the steam trade, the Columbus coal trade definitely improved in July. Though prices have not improved to any great extent, better things are expected after Aug. 1. Dealers reported an increase in the number of orders, which resulted in a tendency to replenish yard stocks. Rural deliveries were slow, due to the late harvest. Considerable domestic tonnage moved through the Columbus gateway to northern Ohio and southern Michigan. Retail prices were well maintained. Smokeless lump and egg are quoted at $7.75; splints and Kentucky block and lump, $6.25@$6.75, and Hocking lump, $5.25. These prices are subject to the usual discount of 50c. for cash.

Though more interest was shown in steam circles throughout the month, the improvement was not as marked as that in the domestic sizes. Utilities had generally contracted for their requirements, as well as some small industrial plants. Other manufacturers expect to seek bargains by buying the major portion of their needs in the open market. Some railroad contracts were closed for

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

LOW-VOLATILE, EASTERN	Market Quoted	Week Ended July 6, 1929	July 13, 1929	July 20, 1929	July 27, 1929
Smokeless lump	Columbus	$2.65@$3.00	$3.75@$3.00	$2.75@$3.00	$2.75@$3.00
Smokeless mine-run	Columbus	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Smokeless screenings	Columbus	1.15@ 1.30	1.15@ 1.30	1.15@ 1.30	1.15@ 1.30
Smokeless lump	Chicago	2.25@ 3.00	2.75@ 3.00	2.75@ 3.00	2.75@ 3.00
Smokeless mine-run	Chicago	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Smokeless lump	Cincinnati	2.65@ 3.00	2.50@ 3.00	2.50@ 3.00	2.65@ 3.00
Smokeless mine-run	Cincinnati	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.85@ 2.00
Smokeless screenings	Cincinnati	1.25@ 1.40	1.25@ 1.40	1.25@ 1.50	1.25@ 1.55
*Smokeless mine-run	Boston	4.10@ 4.20	4.15@ 4.25	4.15@ 4.25	4.15@ 4.25
Clearfield mine-run	Boston	1.55@ 1.85	1.55@ 1.85	1.55@ 1.85	1.55@ 1.85
Cambria mine-run	Boston	1.80@ 2.00	1.80@ 2.00	1.80@ 2.00	1.80@ 2.00
Somerset mine-run	Boston	1.60@ 1.90	1.60@ 1.90	1.60@ 1.90	1.60@ 1.90
Pool 1 (Navy Standard)	New York	1.95@ 2.40	1.95@ 2.40	1.95@ 2.40	2.10@ 2.35
Pool 1 (Navy Standard)	Philadelphia	2.25@ 2.60	2.25@ 2.60	2.25@ 2.60	2.25@ 2.60
Pool 9 (super low vol.)	New York	1.70@ 1.90	1.70@ 1.90	1.70@ 1.90	1.70@ 1.90
Pool 9 (super low vol.)	Philadelphia	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Pool 10 (h. gr. low vol.)	New York	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80	1.50@ 1.75
Pool 10 (h. gr. low vol.)	Philadelphia	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75
Pool 11 (low vol.)	New York	1.35@ 1.40	1.35@ 1.40	1.35@ 1.40	1.35@ 1.40
Pool 11 (low vol.)	Philadelphia	1.45@ 1.65	1.45@ 1.65	1.45@ 1.65	1.45@ 1.65
HIGH-VOLATILE, EASTERN					
Pool 54-64 (gas and st.)	New York	$1.25@$1.40	$1.25@$1.40	$1.25@$1.40	$1.25@$1.40
Pool 54-64 (gas and st.)	Philadelphia	1.15@ 1.40	1.15@ 1.40	1.15@ 1.40	1.15@ 1.40
Pittsburgh sc'd gas	Pittsburgh	1.90@ 2.00	1.90@ 2.00	1.90@ 2.00	1.90@ 2.00
Pittsburgh gas mine-run	Pittsburgh	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75
Pittsburgh mine-run	Pittsburgh	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75
Pittsburgh slack	Pittsburgh	1.00@ 1.10	1.00@ 1.10	1.00@ 1.10	1.00@ 1.10
Kanawha lump	Columbus	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00
Kanawha mine-run	Columbus	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.25@ 1.55
Kanawha screenings	Columbus	.85@ 1.00	.85@ 1.00	.85@ 1.00	.85@ 1.00
W. Va. lump	Cincinnati	1.65@ 2.00	1.65@ 2.00	1.75@ 2.00	1.75@ 2.00
W. Va. gas mine-run	Cincinnati	1.40@ 1.50	1.40@ 1.60	1.35@ 1.50	1.35@ 1.50
W. Va. steam mine-run	Cincinnati	1.25@ 1.35	1.20@ 1.40	1.20@ 1.35	1.25@ 1.35
W. Va. screenings	Cincinnati	.75@ .95	.75@ 1.00	.75@ 1.15	.75@ 1.10
Hocking lump	Columbus	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00
Hocking mine-run	Columbus	1.35@ 1.60	1.35@ 1.65	1.35@ 1.65	1.35@ 1.65
Hocking screenings	Columbus	1.10@ 1.25	1.10@ 1.25	1.10@ 1.25	1.10@ 1.35

*Gross tons, f.o.b. vessel, Hampton Roads.

Ohio coal at $1.65@$1.70 for mine-run. These usually were made with concerns on the railroads' own lines. Lake business continued good with some Hocking coal finding its way to the Northwest. Screenings remained firm with the lake trade absorbing the surplus. Hocking and Pomeroy prices are as follows: 4-in. lump, $2; 2x4-in. lump, $1.65@$1.75; mine-run, $1.35@$1.65, and screenings, $1@$1.20.

Demand was good in the Pittsburgh coal market during the month of July though prices failed to show improvement. Railroad buying was fair and to this must be added a slightly increased industrial demand. There was some movement of domestic coal at prices showing a minimum profit and some tonnage moved to the lakes, also at rock-bottom quotations. With demand holding up as it did during the month there is some feeling that prospects for better prices in the fall are good. Domestic sizes were quoted at $2.15@$2.25, as compared to $2.40@$2.60 last year; steam slack, 80c.@90c., and gas slack, $1@$1.10. Mine-run and industrial lump remained unchanged. Domestic sizes probably will be advanced to $2.40 in September.

Central Pennsylvania production picked up somewhat during the month of July and operators foresee substantially better business in the future. Prevailing prices at the end of the month were as follows: pools 11 and 18, $1.65@$1.75; pool 10, $1.75@$1.90; pool 9, $2@$2.15; pool 71, $2.20@$2.25, and pool 1, $2.30@$2.45.

STEAM coal maintained a firm position in the New England market during the month of July. Though spot prices were no higher than in June, the base price was firmly maintained. Pocahontas and New River mine-run could be had at $4.15@$4.25 per gross ton f.o.b. Virginia terminals, but a bottom price of $4.25 is predicted in the near future. Corresponding prices on cars at Boston for inland delivery were $5.40@$5.50, with Providence about 10c. less. Nut and slack brought $5.10 on cars, with a fairly steady demand.

Less desirable coal was offered on the fringes of the market at 10c.@15c. less than the prices quoted above. However, these coals do not set the pitch for the market. The trade is much interested in an announcement by the New Haven R.R. that it will buy 200,000 tons or more from all-rail shippers.

The bituminous market in New York was quiet during the month of July. Spot buying was slow and prices did not fluctuate to any great extent. A better tone was noticeable toward the end of the month and some operators are of the opinion that conditions will improve soon, as many consumers have told salesmen that they would be in the market the latter part of August or the first of September. Some operators refused to increase their contracts, saying they wanted coal for spot buyers.

Heavy demand for current needs was the feature of the Philadelphia market in July. However, the producers are concerned about the lack of buying for storage purposes. It is expected that some improvement will be noted in August, or even as late as September. The record rate of steel production, which has held throughout the summer, also leads many to believe that it will continue, with a favorable effect on the coal trade. Little was heard from railroad buyers during July and tidewater business was slow. Bunker demand was only normal, with some indications of improvement in the future.

SOME improvement was noticed in the Birmingham market in July, though the demand still remained light and the new business booked was not sufficient to increase running time at the mines to any appreciable extent. Steam coal moved in a very satisfactory manner due to restrictions in the output and the higher quality of commercial fuel was especially affected by the absence of demand for domestic sizes. Minimum tonnages only moved on contracts. The U. S. Engineers' Department, New Orleans, renewed a contract for 30,000 tons of high-grade fuel and bunker orders for small tonnages also were placed. Quotations on steam coal remained unchanged.

Domestic buyers were backward throughout the month and demand picked up slightly only in the latter part. An optimistic tone prevailed in spite of the small amount of business, as there are indications of an increased demand in the future. Mine prices advanced on Aug. 1 as follows: Black Creek lump, $4.25@$4.50; egg, $4.25@$4.35; nut, $3.10@$3.35; Cahaba lump, $3.80@$4.80; egg, $3.80@$4.55; nut, $3.35; Corona lump, $3.10; egg, $2.95; nut, $2.65; Carbon Hill lump and egg, $2.65; nut $2.10@$2.40; Big Seam lump and egg, $2.15; Montevallo lump, $4.80@$5.55; egg, $4.55@5.55; nut, $3.10@$3.50.

DEMAND for buckwheat No. 1 was the outstanding feature in the New York anthracite market during the past month. It continued strong throughout the month and probably will cause a shortage in August. An optimistic tone prevailed among the dealers and indications are that buying will be much stronger after Aug. 15. Domestic mine price advanced 10c. per ton Aug. 1.

High temperatures curtailed household buying and made July one of the slowest months in some years as far as Philadelphia anthracite sales were concerned. Mine running time was sharply restricted though some operators extended it by creating stocks on the ground. This practice, however, is far from general, as most of the companies decided against this practice earlier in the season. There also have been a few instances where certain operators have broken their resolutions not to offer special price inducements to promote stocking, but the practice has not become general. As the business enters the August period there are indications that shipments will improve. A slight increase in retail demand was noticeable the latter part of July in anticipation of the 10c. price advance effective Aug. 1. However, stocks are low and, while dealers are agreed that heavier stocks should be created, they so far have showed no disposition to do so.

Considering the restrictions in production, the steam trade continued satisfactorily. All sizes were absorbed as produced and at times there was a tightness in the supply of buckwheat. Prices remained firm.

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

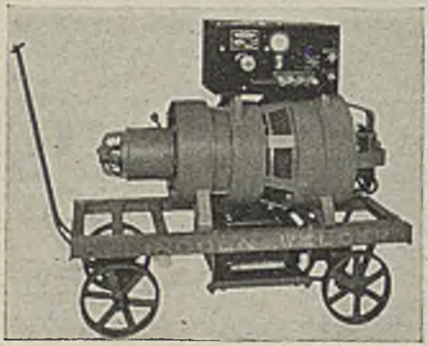
		Week Ended			
MIDDLE WEST	Market Quoted	July 6, 1929	July 13, 1929	July 20, 1929	July 27, 1929
Franklin, Ill. lump	Chicago	$2.70	$2.70	$2.70	$2.70
Franklin, Ill. mine-run	Chicago	2.15	2.15	2.15	2.15
Franklin, Ill. screenings	Chicago	1.75@ 1.85	1.75@ 1.85	1.25@ 1.75	1.25@ 1.75
Central, Ill. lump	Chicago	2.20@ 2.35	2.20@ 2.35	2.20@ 2.35	2.20@ 2.35
Central, Ill. mine-run	Chicago	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85
Central, Ill. screenings	Chicago	1.40@ 1.50	.90@ 1.25	.90@ 1.25	.90@ 1.25
Ind. 4th Vein lump	Chicago	2.25@ 2.75	2.25@ 2.75	2.25@ 2.75	2.25@ 2.75
Ind. 4th Vein mine-run	Chicago	1.50@ 1.90	1.50@ 1.90	1.50@ 1.90	1.50@ 1.90
Ind. 4th Vein screenings	Chicago	1.40@ 1.65	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50
Ind. 5th Vein lump	Chicago	1.75@ 2.25	1.75@ 1.90	1.75@ 1.90	1.75@ 1.90
Ind. 5th Vein mine-run	Chicago	1.00@ 1.75	1.00@ 1.75	1.00@ 1.75	1.00@ 1.75
Ind. 5th Vein screenings	Chicago	.95@ 1.20	.80@ 1.00	.80@ 1.00	.80@ 1.00
Mount Olive lump	St. Louis	2.35	2.35	2.35	2.35
Mount Olive mine-run	St. Louis	2.00	2.00	2.00	2.00
Mount Olive screenings	St. Louis	1.25@ 1.35	1.25@ 1.35	1.25@ 1.35	1.25@ 1.35
Standard lump	St. Louis	1.85@ 1.95	1.85@ 1.95	1.85@ 1.95	1.85@ 1.95
Standard mine-run	St. Louis	1.60	1.60	1.60	1.60
Standard screenings	St. Louis	.90@ 1.15	.90@ 1.15	.90@ 1.15	.90@ 1.15
West Ky. block	Louisville	1.25@ 1.40	1.25@ 1.40	1.25@ 1.40	1.25@ 1.50
West Ky. mine-run	Louisville	.90@ 1.40	.90@ 1.40	.85@ 1.40	.85@ 1.40
West Ky. screenings	Louisville	.75@ 1.00	.70@ 1.00	.65@ .80	.65@ .85
West Ky. block	Chicago	1.15@ 1.40	1.15@ 1.40	1.15@ 1.40	1.15@ 1.40
West Ky. mine-run	Chicago	.90@ 1.30	.85@ 1.25	.85@ 1.25	.85@ 1.25
SOUTH AND SOUTHWEST					
Big Seam lump	Birmingham	$2.15	$2.15	$2.15	$2.15
Big Seam mine-run	Birmingham	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
Big Seam (washed)	Birmingham	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
S. E. Ky. block	Chicago	1.75@ 2.10	1.75@ 2.10	1.75@ 2.10	1.75@ 2.25
S. E. Ky. mine-run	Chicago	1.35@ 1.65	1.35@ 1.65	1.15@ 1.60	1.15@ 1.60
S. E. Ky. block	Louisville	1.75@ 2.25	1.85@ 2.25	1.85@ 2.25	1.85@ 2.25
S. E. Ky. mine-run	Louisville	1.30@ 1.65	1.30@ 1.65	1.40@ 1.65	1.40@ 1.65
S. E. Ky. screenings	Louisville	.75@ 1.25	.75@ 1.25	.70@ 1.00	.70@ 1.00
S. E. Ky. block	Cincinnati	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
S. E. Ky. mine-run	Cincinnati	1.25@ 1.50	1.15@ 1.50	1.25@ 1.50	1.25@ 1.50
S. E. Ky. screenings	Cincinnati	.75@ .95	.75@ 1.00	.75@ 1.15	.75@ 1.10
Kansas shaft lump	Kansas City	3.50@ 4.00	3.50@ 4.00	3.50@ 4.00	3.50@ 4.00
Kansas strip lump	Kansas City	2.50	2.50	2.50	2.50
Kansas mine-run	Kansas City	2.50	2.50	2.50	2.50
Kansas crushed mine-run	Kansas City	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25

WHAT'S NEW

In Coal-Mining Equipment

Unified Welder Control Now Offered

Unification of the controls of both the motor and generator is a feature of the new line of "Stable-Arc" welders manufactured by the Lincoln Electric Co., Cleveland, Ohio. The working mechanism of all controls is contained in a ventilated steel cabinet with hand regulators mounted on a panel which forms a side of the cabinet. The use of a combined voltmeter and ammeter makes possible the reading of voltage and amperage on one dial. The new form of construction is said to be economical of floor space and to aid in the operation of the welder.

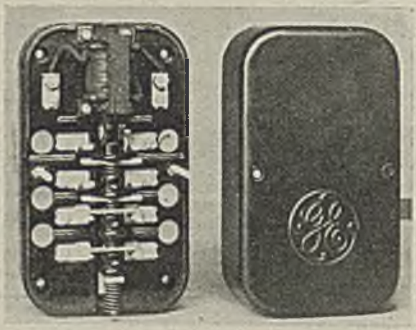


Portable 300-Amp. Welder for A.-C. Supply

Manufacturer Develops Electrical Aids

Recent products developed by the General Electric Co., Schenectady, N. Y., are relay, manual starting switch, electrode holder, magnetic across-the-line switch and an insulating and protecting coating.

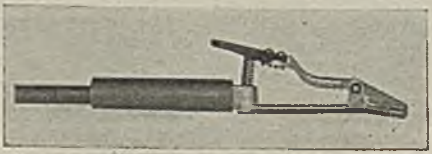
The new relay, according to the company, is designed to meet the demand for a multiple-finger alternating-current device for general-purpose use. It is said to be small, simple, inexpensive and to provide a large variety of contact arrangements. The relay consists of a series of double-break, silver-faced fingers operating horizontally and controlled by a small solenoid. By varying the arrangement of the contact fingers it can be made to operate with four fingers open; three normally closed and one open; two open and two closed; three open; two open, one closed; one open, two closed; two open; one open, one closed, and one closed. The relay may be used when a number of circuits are to be remotely controlled.



Multiple-Finger Alternating-Current Relay

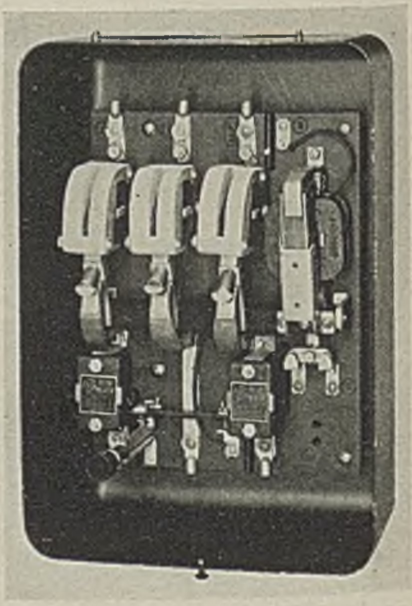
The manual starting switch is designed, it is said, to meet the demand for a small switch which will throw motors across the line. The switch bears the designation CR-1038-E-1 and has a maximum rating of 1 hp. at 110 volts and 2 hp. at 220 to 600 volts, three phase. It consists of a tumbler switch and two small thermal cutouts mounted on a common textolite base. By means of suitable interlocks the switch may be locked in either open or closed position. The design is said to make them particularly reliable. Tinned copper links and tin-plated contact spring and post prevent oxidation.

Jaws of heavy copper alloy, notched to hold firmly any size of electrode wire from $\frac{1}{16}$ to $\frac{1}{4}$ in. in diameter are among the characteristics of the new electrode holder. A molded compound handle is provided to protect the operator from heat and current-carrying parts. The holder is designed for currents up to 300 amp. and may be obtained, if desired, with 5 ft. of extra flexible cable and terminal.



Metallic Electrode Holder

For sealing joints in gas mains and for painting structural iron, motors, oil tanks, fire hydrants, ship hulls, mine machinery and similar equipment requiring sealing and insulating paints, the General Electric Co. offers a series of lacquers in colors for use where an oil-resistant highly protective durable flexible insulating coating is demanded. These paints are said to possess many desirable qualities, including resistance to acids, mineral oils, weather and alkalies; tenacious adhesion to any surface, including galvanized iron and aluminum, and protection against rust. The company also asserts that they are superior to ordinary paints in that they are more easily applied, dry faster, have a more pleasing appearance, are resistant, less affected by high temperatures and have a higher dielectric strength.



CR-7006-D-30 A.-C. Magnetic Switch

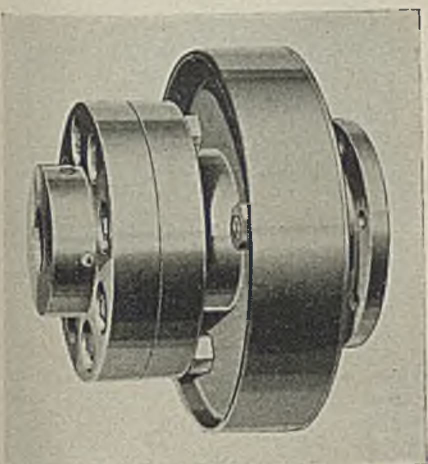
The new magnetic switch, CR-7006-D-30, announced by the company supersedes the type C-R-7006-D-4, and is designed for throwing small motors directly across the line. It can, however, be used as a primary switch for slipring motors having secondary control. It is recommended by the company for use with small motors wherever a simple direct control, providing complete protection for the motor and operator, is required.

The manufacturer claims that the

switch incorporates all modern design principles from the standpoint of size, mechanical construction, appearance and electrical rating. The inclosing case is of the drawn-steel type with plenty of room for wiring, and the reset button for the overload relays extends through the cover, allowing its use without removing the cover. Practically all parts are said to be improved over the older D-4 form. Ratings are 7½ hp. at 110 and 15 hp. at 220 or 440/600 volts.

Backstop Is Integral Part Of Flexible Coupling

A combined automatic backstop and flexible coupling designed for use on elevators, conveyors and process equipment drives where there is a possibility



Coupling and Backstop Assembly

of reversal of travel when the equipment is standing idle or when the motor is stopped by the operator, or fails, is now being manufactured by the D. O. James Mfg. Co., Chicago. It may be obtained in a number of shaft sizes and horsepower capacity.

Reduced Cost Claimed For Core Drills

The Ingersoll-Rand Co., New York, states that its new line of "Calyx" drills have been developed to supply the demand for types comparable with the diamond drill, but free from the expense of diamonds. These drills utilize chilled shot or crushed steel as the cutting medium in the harder substances. It is claimed by the company that in the majority of instances these machines will take out cores at a considerably reduced cost.

Standard machines provide for cores ranging from 1½ to 11½ in. in diameter and if it is desired to drill larger holes for mine ventilation, pipe and elevator shafts, wire saw tension poles, etc., larger tools may be obtained. "Calyx" drills are designed in general for prospecting, foundation work or other soundings but may be obtained for pavement testing and deep-hole drilling up to 5,000 ft. Gasoline, steam-engine or electrically driven types may be obtained, as well as small types for hand operation.

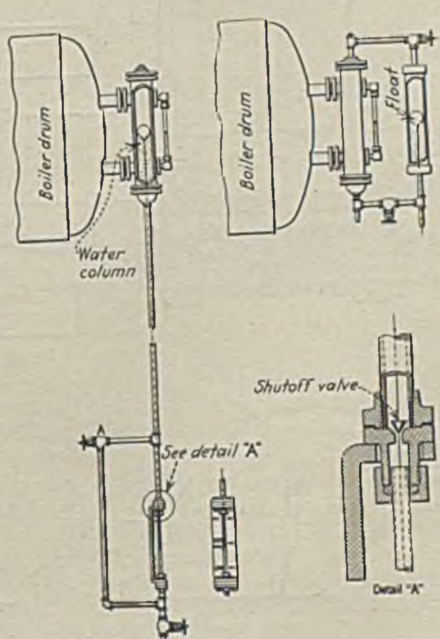
Electric Drive Applied To Stoker Operation

The type E and type K underfeed stokers, manufactured by the Combustion Engineering Corporation, New York, usually are steam-driven but can now be equipped with an electric-motor drive, according to a recent announcement. This drive, it is said, is applicable to either of these stokers and may be used wherever the steam drive is impractical, as, for instance, where the pressure is below 60 lb. per square inch. It is composed of a double worm-gear reduction unit and a Reeves variable-speed transmission unit. Compactness and convenience are claimed and it is said that the motor is placed above the floor dirt and that access to the fire door is not hindered.

Convenience and operation in a cold-water circuit with consequent reduction in corrosive action and the possibility of high pressures with the ordinary round glass are advantages claimed for the new C-E water level indicator recently perfected by the Combustion Engineering Corporation. This device permits the placing of the indicators at any desirable location or elevation, according to the company. The construction and operation is shown in the accompanying illustration.

Inside the usual water column is a non-corrosive float suitable for the maximum working pressure. This float

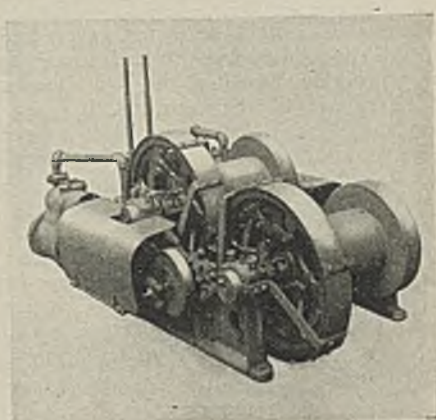
Construction Details, Water-Level Indicator



is direct-connected by means of a non-corrosive wire extending downward to an indicator in the water glass. The circuit around this indicator is filled with cold water, which has no corrosive effect on the glass. The indicator is so adjusted that when the float in the water column on the drum is in its normal position the indicator in the lower glass is in its normal position in the center of the glass. Consequently, the indicator fluctuates with the up and down movement of the water column float at the drum. To prevent leakage in case the water glass is broken, an automatic shut-off valve is placed in the circuit directly above the glass.

Compressed-Air Hoist Said To Be Compact

Ruggedness, strength, piston valves, band-type frictions, cast-steel cut stub-tooth gears and Alemite lubrication are



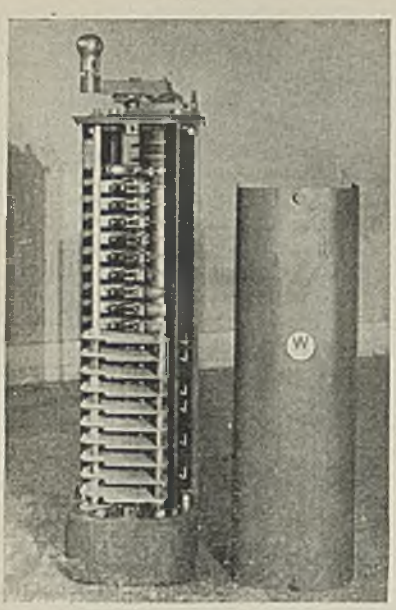
"American" Mine Scraper Hoist

some of the features claimed for the "American" compressed-air mine scraper hoist manufactured by the American Hoist & Derrick Co., St. Paul, Minn. The cylinders are 7x8 in., and the hoist is said to develop a single-line pull of 4,300 lb. at an air pressure of 65 lb. per square inch. Compactness also is claimed as the hoist is only 3 ft. high and 4 ft., 8 in. long.

Reversible Feature Aids Controller Operation

A new line of reversing drum controllers has been announced by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. These are known as Type A, classes 8-300 and 8-400 for d.-c. and 12-700 and 12-800 for a.c. service. They are designed, the company states, for heavy usage in operating cranes, hoists, bending rolls, railway turntables and similar equipment.

The drum cylinder consists of rolled brass supporting disks assembled on a micarta insulated steel shaft between brass and micarta insulating rollers.



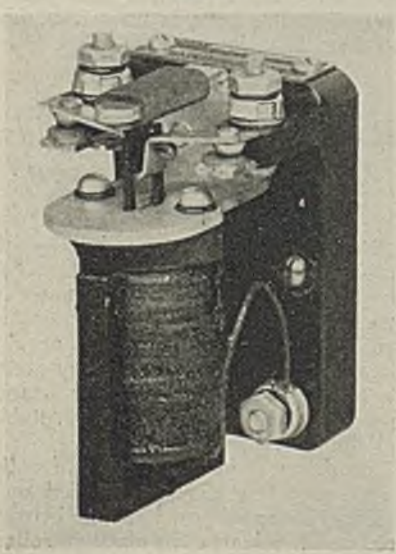
Westinghouse Reversing Drum Controller

Reversible contact segments are bolted to the supporting disks in such a way as to eliminate burning the bolt heads. Fingers are of the compensating self-aligning type which are said to assure square alignment on the contact segments. Easy operation is assured by a flexible roller bearing in the top and a ball thrust bearing in the base. Several types of operating heads, it is stated, may be used, depending on the requirements of the various installations. Castings have been replaced with steel parts, wherever possible, to provide strength and reduce size.

Signal Relay Warns When Power Fails

A new "signal" relay announced by the General Electric Co. is designed for application where a small, inexpensive device is needed to actuate a warning signal when power fails or voltage drops on an important circuit. The device has been given the number CR-2904-F-1.

Keeps Watch on Power



A typical application of the relay is on storage-battery charging outfits. When the battery falls below the critical voltage the relay places it on charge or increases the charging rate, and disconnects it when the voltage has come back to its full value.

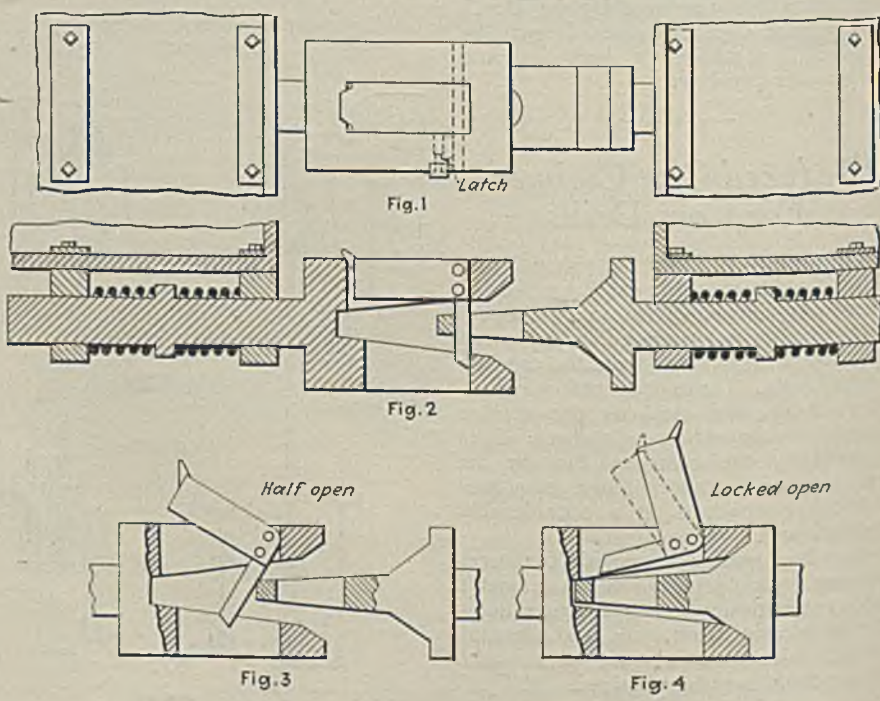
Portable Extinguishers Go in Production

Production on Alfite (carbon dioxide) portable hand extinguishers has been started by the American-LaFrance and Foamite Corporation, Elmira, N. Y. They may now be obtained in 7½- and 15-lb. sizes for a variety of uses, including fires in switchboards, relay equipment, small generators and other electrical equipment. The company states that they also are especially adapted to extinguishing fires in gasoline, fuel and motor oils, paints, varnishes and alcohol. Both models are fitted with a cone-shaped horn to concentrate the gas at the point of the fire. Carbon dioxide, which is used in these extinguishers, is said to be advantageous in that it does not damage anything with which it comes in contact, leaves no residue, does not conduct electricity and will not damage insulation.

Safe Automatic Coupling

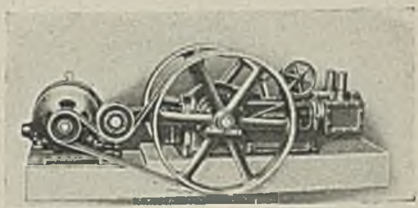
Several advantages are claimed for the automatic coupling (invented by Thomas C. Hogan and Louis Mitchell, Menard, Ill.) shown in the accompanying sketch. The coupling operation is entirely automatic and it is asserted that the cars may be coupled on curves and can be adjusted for side or vertical play. Cars cannot be uncoupled until the trip stops, a feature promoting safety, and, in addition, the coupling hook may be locked open if necessary.

Details of Construction: Automatic Coupling



Roller Bearings Installed In Compressors

Timken roller bearings are used on the main crankshaft journals of the new line of single horizontal straight-line air compressors brought out by the Worthington Pump & Machinery Corporation, Harrison, N. J. Capacities range from 100 to 300 cu.ft. per minute and, operating at moderate speeds, maintenance charges and attendance are said to be practically eliminated.



Worthington Timken-Equipped Compressor

These compressors are for use in the smaller power plants and they have been designed, it is said, to eliminate worry and expense in operation. New features include, according to the company, elimination of bearing adjustments, oil rings to deflect the surplus oil and return it to the crankcase, oil-tight crankcase and "feather valves" which flex when opening against a curved guard to permit the passage of air.

The compressors may be regulated by an automatic starter and pressure switch mounted on the motor or a pressure regulator may be attached to the inlet valves. They may be obtained with ball-bearing idlers for short belt drive, texrope drives, or a synchronous motor may be mounted directly on the shaft.

Conveyor-Belt Idlers Newly Developed

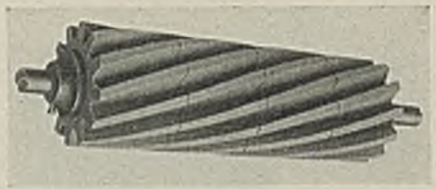
Demountable pulleys are a feature of the new 203-YD troughing idler developed by the Robins Conveying Belt Co., New York City. The three pulleys with bearings and grease seals are inter-

Troughing Idler for Belt Conveyors

changeable and each, it is said, may be lifted out without the use of tools, except for disconnecting one grease line. The side pulleys are set at an angle of 20 deg. to the horizontal, giving, it is claimed, high capacity without bending the belt, and the ¼-in. gap between pulleys prevents creasing or catching.

Two ¾-in. Timken roller bearings are used in each pulley. Adjustment is made by the threaded sleeve on the end of the shaft and subsequent wear is taken up by a coil spring pressing against the inner race. The brackets are made of malleable iron and are mounted on a structural steel angle base which is said to be strong, stiff and self-cleaning. Six-inch clearance is provided at the ends for the return strand of the belt. Reservoirs in the hub are supplied with grease through pressure fittings and loss of grease or entrance of grit or moisture is said to be prevented by double labyrinth seals and felt washers.

For removing dirt from the return side of a conveyor belt, the Robins company offers a newly developed "Squeegee" rubber brush, shown in the accompanying illustration. This is to take the place of other devices which wear out quickly, require constant adjustment or are expensive. It consists of series of spiral flutes made of rubber and may be mounted on the same driving mechanism as is now used on Robins brush cleaners. Located at a point far



Robins "Squeegee" Rubber Brush

enough from the head pulley so that the belt is straightened, the cleaner is said to be effective over the entire surface of the belt. One of the advantages claimed is that it bears only lightly on the belt, thus reducing wear.

Flood-Lighting Projector Offers Advantages

A new line of flood-lighting projectors of interest to factory, office building and store managers and mine operators has been developed by the General Electric Co. The projectors, according to the company, are non-rusting; glass reflectors and lamps are totally inclosed; non-ferrous cases insure good heat radiation, minimum dimensions and light weight; universal focusing mechanisms allow easy and accurate focusing and small three-point base design and swivel make for simple and economical mounting, with ease of installation and orientation of the flood-light beam.

Flood-Lighting Propectors, 250- to 1,000-watt Capacity

The type L-29 projector is designed for a 250-watt flood-lighting lamp, the L-30 for a 500-watt and the L-31 for a 1,000-watt lamp. Several types of reflectors and lenses are available.

Lifting and Pulling Jobs Done by Puller-Jack

For most purposes, it is claimed, the new "Anchor" Puller-Jack, manufactured by the T. H. Edelblute Co., Pittsburgh, Pa., does the work of chain hoists, lifting jacks, winches or the block and tackle. The standard outfit consists of the machine itself with a 3-ft. steel handle, 15 ft. of load chain with slip-hook and swivel, 3½ ft. of tail chain with grab-hook and a sheave block. The action is said to be positive and the manufacturer claims that it may be used in any position and will pull the length of the load chain without changing the hold. A quick release lock is provided to instantly release the load under full strain.

The manufacturer states that it can be used for shifting track on refuse dumps or in pits; for moving conveyors up to the working face; pulling machinery out from under rock-falls or cave-ins; rerailing cars; loading or unloading heavy machinery; pulling posts, crossbars and timbers; spotting railroad cars; tightening trolley wire; lifting mine locomotives for retrucking, and setting heavy machinery in place.

Two Cylinders Feature Drill Sharpener

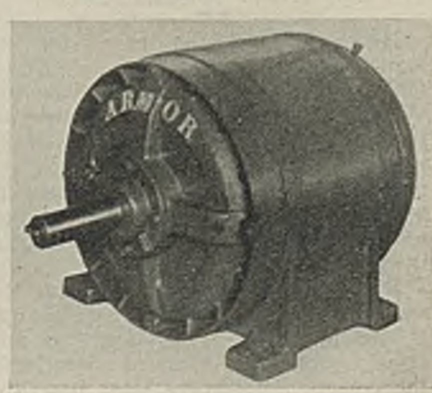
Low air consumption and unusual power are claimed for the new DS-3A double-cylinder small drill steel sharpener placed on the market by the Gardner-Denver Co.,, Denver, Colo. It stands 44½ in. high, weighs 1,500 lb., and has a base diameter of 24 in. Two vertical cylinders are part of the equipment and the company states that they give greater power and more speed in handling material. The upper piston is used independently in forging operations and the lower piston is brought into play only when clamping.

This machine, it is said, will forge bits and shanks and sharpen section drill steel not exceeding 1¼ in. and not requiring a bit of more than 2½ in.; form lug shanks on 1-, 1⅛- and 1¼-in. round steel, and make collared shanks of 3¼ and 4¼ in. on ⅞- and 1-in. hexagon or quarter-octagon steel.

Explosion-Proof Motors Totally Inclosed

The Armor Electric Mfg. Co., Erie, Pa., is now offering a newly developed line of Timken-equipped explosion- and abrasion-proof totally inclosed electric motors in ratings of from ½ to 50 hp., 550, 440 or 220 volts, two or three phase, 25 or 60 cycles. These motors

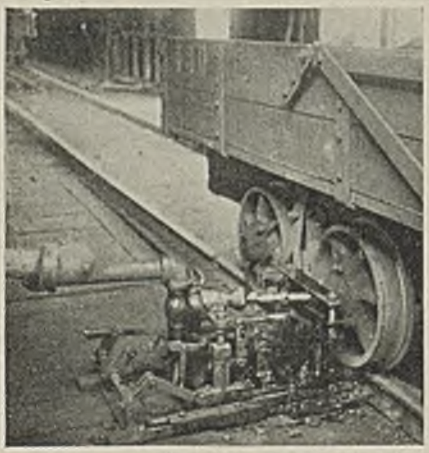
Armor Timken-Equipped Explosion-Proof Motor



are of the squirrel-cage induction type and are said to be particularly suitable for use where the atmosphere contains explosive fumes or dust, as in chemical plants, coal mines, foundries and cement plants. Improved power factor and general efficiency, rigid and wear-resisting windings, large heat radiating surface and Timken bearings are among the improvements claimed.

Machine Greases Cars Automatically

Elimination of greasers and a saving in oil are the two principal advantages claimed for the automatic mine-car lubricator recently perfected by the Automatic Mine Car Lubricating Co., Natrona, Pa. It is designed to oil plain bearing car wheels with center oiling,



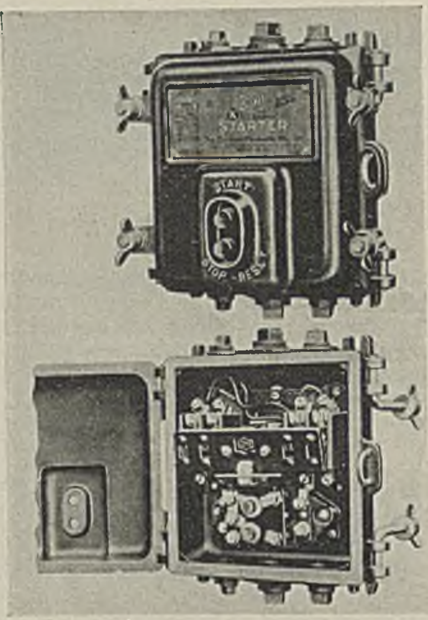
Automatic Lubricator for Use with Center-Oiling Wheels

or wheels capped for center oiling, while the car is in motion. The machine is brought forward by the mine locomotive in passing or by a hand lever and locked in place. The oiler is operated by the mine-car wheels passing over and depressing two levers at the outside of the rail. Oil is supplied by a barrel permanently connected to the machine.

Starters Now Protected By Dust-Tight Case

Dust-tight inclosing cases for its across-the-line starters are now offered by Cutler-Hammer, Inc., Milwaukee, Wis. For motors up to 5 hp. the case is made of cast iron, and for larger sizes of welded boiler plate. They are provided with a soft Para rubber gasket between the cover and the case and eye-bolts with wing nuts at the sides to hold the cover tight.

In addition to being dust tight, the small cast-iron inclosure is said also to be weatherproof. The start, stop and reset buttons are mounted directly in the cover. The larger sizes have the



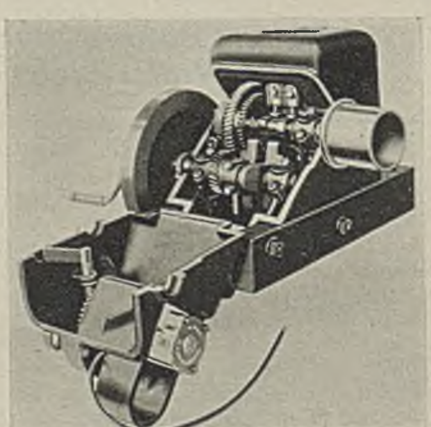
Inclosed Automatic Motor Starter

reset button only in the cover and a separate dust-tight push-button station for remote control. This equipment is offered for installation in mines and other places where large quantities of dust in the air may interfere with the operation of the starter.

Self-Oiling Features Small Engines

A new line of gasoline-kerosene engines in ratings from 1½ to 7½ hp. has been developed by Fairbanks, Morse & Co., Chicago. These, according to the company, include new all-inclosed self-oiling features. The 1½-hp. type is recommended for portable pumps, air compressors, generator saws, grinders, polishers and similar uses. It is 16 in. high, 22 in. long and 19 in. wide and weighs 150 lb. Two pulleys provide for engine speeds of 1,500 and 750 r.p.m. and there also is a mechanical regulator which

Portable Engine With Cover Raised, Showing Two-Speed Arrangement of Pulleys



permits slowing the engine down to 1,100 r.p.m.

There are said to be 25 per cent less parts in this machine and it is completely protected against dirt, dust, rain and snow through the fully inclosed feature. The removal of two bolts allows all working parts to be inspected. Removal of 18 bolts dismantles the entire engine. Self-oiling is accomplished through a special lubricating system and no grease cups are required. Felt retainers on the crankshaft and camshaft, return oil grooves on these shafts and a special crankcase breather which maintains a vacuum within the crankcase prevent the loss of oil by leakage.

Cam Switch Controls Auxiliaries

The General Electric Co. announces a new direct-current cam switch, designated CR-3108, developed to satisfy the needs of central stations for such a device to control auxiliaries such as pumps, blowers, etc. The switch, it is stated, can also be used for similar non-reversing applications where the current inrush or starting torque is not severe or the operations are not frequent.

The new switch is available in two forms; both are for non-reversing service with armature regulation over five points, while one form has field regulation over 22 points. The intermittent armature current capacity is 1,000 amp., while the same capacity, continuous rating, is 500 amp. The switches are rated 550 volts, maximum.

New Line of Fuse Pullers For Hand Use

The Ideal Commutator Dresser Co., Sycamore, Ill., has announced a line of fuse pullers in four different sizes. These are designed, according to the company, to eliminate the danger of pulling and replacing cartridge fuses by hand and, in addition, may be used for adjusting line cutout clips or handling laboratory test tubes or live electrical parts.

Impact Pulverizer for Coal and Coke

An improved impact-attrition pulverizer, known as the Whirlwind, which is said to reduce coal, coke and other materials to uniform fineness without need of air separation, is announced by George F. Pettinos, 1206 Locust St., Philadelphia, Pa. The pulverizer acts also as a separator and holds back material until it has been reduced to desired fineness.