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Theme Song—1931

To industry in general, perhaps nothing better became the year just closed than its departure. And yet, on the purely physical side, the balance sheet of the coal industry in 1930 was not wholly unfavorable.

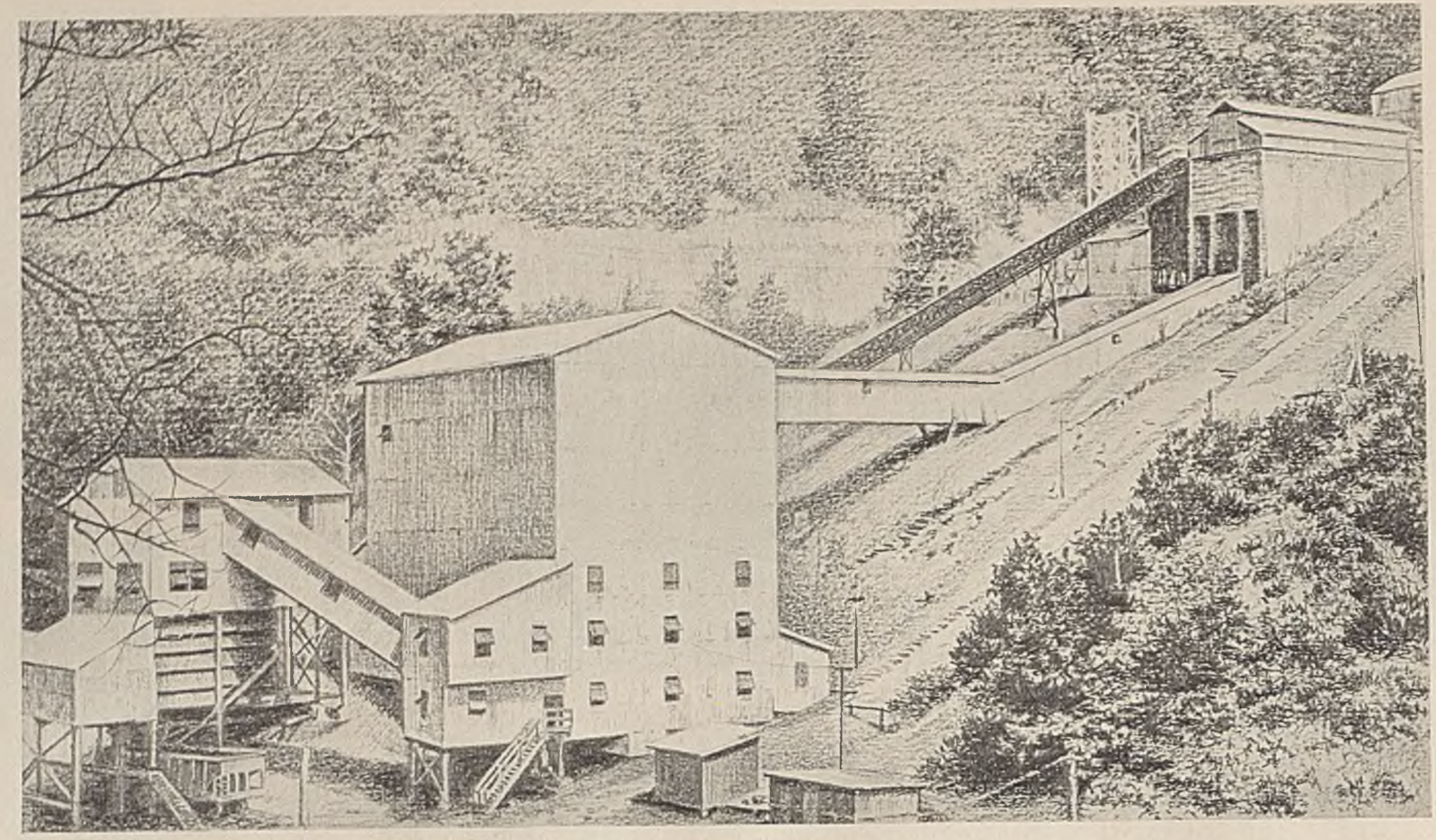
In a year when retreat was the general order of the day for business in its war against depression, the shrinkage in volume of production and the decline in prices of coal were among the most modest reported by any major industry. Moreover, as shown in the pages following, progress in mechanization and in preparation was neither halted nor materially slowed up by the prevailing pessimism of the 1930 seers of business prospects.

Developments of 1930, however, do accentuate what must be the major problem of the coal industry in the coming year. That problem is the application of profit engineering to the volume of production which can reasonably be expected in 1931.

Volume suggests mass production. But the two terms are not necessarily synonymous, and, unless this is clearly understood, there is danger of indulging, as many business men have done in the past, in an orgy of production productive of nothing but profitless volume.

If mass production methods are to be successful in the coal industry, the application must be in the direction of a greater concentration than has been common in the past. The application must be one which recognizes existing limitations on immediate expansion in market demand and has as its fundamental idea concentrated production methods which will permit sales at a profit.

Profit, too long lost sight of in the race for volume, must dominate planning and performance if the coal industry is to be put in a position to meet successfully the greater problems which will confront it in the years to come. That profit can be realized only by the fullest employment of all the managerial and engineering skill which the industry possesses and the mechanical aids which reduce unit costs of production without impairing the earning power of those dependent upon the industry for their livelihood.



Seeing Preparation Through in Answer to Competition

CLEARING SKIES

+ Forecast for Business in 1931

By VIRGIL JORDAN

Economist, McGraw-Hill Publishing Co.

A POST-MORTEM on business in 1930 would be a bit premature. Business was sick enough, in all its parts, the world over; but, as in the case of Mark Twain, reports of its demise were grossly exaggerated. All that is in order is an estimate of the degree of its illness, a diagnosis of its causes, and some prognosis of the probable course of the malady from now on.

In trying to find out how sick a patient is, the doctor doesn't usually depend wholly upon the patient's description of his feelings, but tries to check up on it by taking his temperature, pulse, blood pressure, etc. Business in 1930 felt a great deal worse than it was. This discrepancy is usual in depression periods; but it was much more marked this time. Just as the spread of popular medical knowledge has made a great many people imagine they are sicker than they really are, so it is possible that the more extensive discussion of business conditions and the publication of business statistics in the press has tended to make business men more aware of depressions than they used to be.

At any rate, the business recession in 1930 did not affect the figures as much as it did our feelings. The level of business activity in the United States never actually falls as much below the normal level as we imagine for any great length of time. This is because the busy-ness involved in just keeping a nation of 125,000,000 people going is extremely large—of astronomical proportions in comparison with that of other countries. The total business turnover in this country probably aggregates around $1,000,000,000,000 a year. This is like a huge reservoir with an almost infinite number of inlets and outlets, and it requires some much more drastic interference with the water supply or the rainfall than we have known since the World War greatly to affect the level of the water in it. This is as true of booms as it is of depressions.

So, if we take as a water-mark the level of general business activity which would have existed in this country if the average annual rate of increase over the past fifty years had continued during 1930, and call that normal, the best and most comprehensive measurements we have indicate that the actual level during that year was on the average only 10 per cent below normal. Another way to get an idea of the extent of business depression during 1930 is to compare the actual amount of production and trade in certain lines for the year as a whole with the average for the preceding five years. The accompanying table shows these comparisons for a wide variety of lines of industry and business, together with some composite indicators. Averaged out, such comparisons show about the same thing: if the average for the 1925-29 period was a normal level, 1930 was about 10 per cent below that.

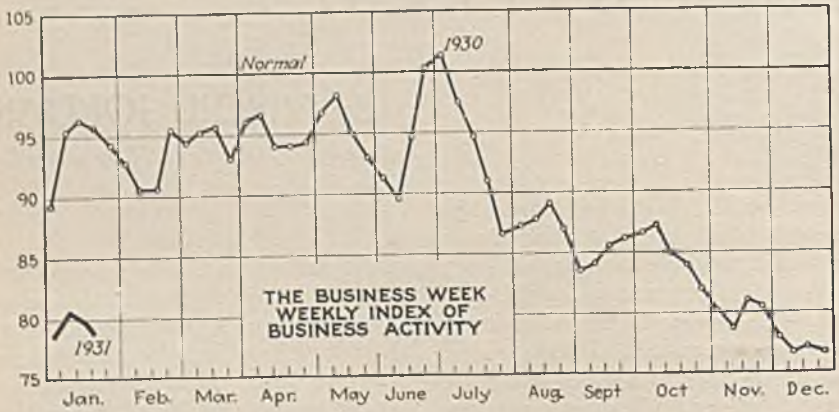
A closer analysis indicates two important facts about the year. The first is that, from the point of view of general business, the depression did not really begin until the middle of the year. The first half was fairly good; the second half was very bad. This is clearly seen in the accompanying chart showing the course of general business activity during the year as measured by *The Business Week's* weekly index. Using only rough figures, business averaged about 5 per cent below normal during the first half and about 15 per cent below during the second half. This is important to note, because it gives a hint as to how long the real depression has lasted and how long it may be expected to last. It is important for another reason which I shall mention later in discussing the causes of the depression.

A second point to be noted is that the slump affected the different aspects of business activity very unequally. The basic industries producing raw materials, equipment, and all the means of production called capital goods declined much more than the production and distribution of consumers' goods, which make up what is called general trade. This is usual in depressions, just as in boom periods, but it was strikingly shown during 1930. The table illustrates this in many ways: Building construction was off 27 per cent from the average of the preceding five years; locomotive shipments, 27 per cent; automobile production, 22 per cent; steel production, about 14 per cent; although the total volume of manufacturing as a whole was down only about 11 per cent. In contrast with this, the value of checks drawn and cashed in cities not affected by the slump in stock trading was down only about 2 per cent and department store sales only 3.9 per cent.

In both these cases if lower prices or greater value of the dollar were allowed for, the volume of turnover probably would show up above the average of the five preceding years. Electric power production, which reflects not only industrial activity but also general trade and the demand from the greatest industry of all—

the home—was nearly 18 per cent above the five-year average and only about 1 per cent below the normal or expected level on the basis of the average annual increase over many years.

All this means that, taking the year as a whole, it is probable that the quantity of goods consumed by the citizens of this country during 1930 was very little if any below the normal amount, and that the real slump was in the demand for and production of so-called capital goods, which fell off about 10 per cent on the average below the normal level.



This may seem puzzling, but it works out fairly simply when you consider the decline in prices of consumers' goods. Roughly, the total cash income of workers averaged about 10 per cent lower in 1930 than in the preceding five years, but the average cost of living also was about 10 per cent lower, so that the total purchasing power probably remained about the same. The slump was really a decline in the quantity of capital goods produced and sold—buildings, plant, machinery, utilities, and fixed capital of all kinds. This is what makes the difference between normally prosperous conditions and depression, not the variations in the amount of food and clothing and such things consumed. The capital goods mentioned account for about 30 per cent of industrial production, and the remainder varies very little. This may be one reason for the fact that even at the extreme depths of depression the volume of industrial output in this country has never fallen much below 70 per cent of normal.

These facts give us some clew to the underlying causes of the depression. The quantity of capital goods that are bought, and therefore produced, depends upon two fundamental factors. One is how much it costs to borrow the money to buy them with; the other is how much the purchasers expect them to yield. When these two factors are in balance, the production of capital goods will run along normally and general business is likely to be fairly stable and prosperous. If money is so abundant that it costs less than it yields when invested in fixed capital, you have the makings of a boom period; and vice versa, when it costs more than it really yields, you have the makings of a depression period.

This is what happened in 1928 and 1929. Beginning as long ago as 1925 the market rate of interest on long-term money for real investment in fixed capital began to be noticeably greater than the actual yield. There were many reasons for this which I cannot go into here, but the evidence is clearly to be seen in the steady decline in residential building since 1925. By 1928 and 1929 the discrepancy became so marked as the result of the abnormal and artificial demand for money in the stock market boom to carry excessive issues of pyramided securities which did not represent real investment, that such investment was drastically checked in this country, and especially abroad.

The result was a progressive decline in the production of capital goods of all kinds, particularly building. Since such production is the determining factor in the demand for labor and raw materials the world over, employment fell off and commodity prices declined rapidly. It is more than a coincidence that the declines in employment, in commodity prices, and in new security issues during 1930, as compared with the average of the preceding five years, were all of about the same proportions.

Business in 1930

(Based on full year or eleven months)

	Percentage of 1925-29 Average
General trade	89.8
Total productive activity	79.8
Industrial production	88.8
Building contracts	72.8
Iron and steel	85.2
Automobiles	77.4
Locomotives (shipments)	72.8
Non-ferrous metals	87.0
Bituminous coal	83.3
Textiles	84.0
Leather and shoes	93.9
Paper and printing	99.0
Tobacco manufactures	110.7
Electric power production	117.6
Brick	53.9
Lumber	62.6
Merchandise carloadings	93.1
All other carloadings	79.6
Department store sales	96.1
Five and Ten Cent Store chains	112.1
Bank debits outside New York City	98.0
Life Insurance sales	108.3
Wholesale prices, all commodities	88.3
Factory employment	85.9
New capital issues	91.0

THE fundamental cause of this business depression was the steady and drastic contraction of credit which took place in this country and the world over the middle of 1928 on, tending to raise the market rate of interest for long-term capital to uneconomic levels, and thereby checking the production of capital goods.

The saving factor that helped to cushion the decline in the first half of 1930 was the stimulation of public construction and of a good deal of industrial and utility construction work as the result of the President's conferences in November, 1929. This was made possible partly by the fact that many strong corporations had large cash surpluses for the purpose and did not have to borrow and partly because governments in this country do not care very much what they have to pay for money for such purposes, so that the interest rate is not a real factor. That is why public construction work is looked to as a means of softening business depressions, but it only illustrates the economic forces involved in them. The mildness of the recession during the first half of 1930 was largely a reflection of the fact that public agencies, and they alone, were willing and able to borrow money for the production of capital goods. As a matter of fact, the level of building construction practically touched normal by June, 1930, as the result of this influence. The same influence has continued since and will be more marked during the first half of this year, but the depression has since gone so far that public construction alone can do relatively little to raise the general level of business activity.

These things help somewhat to give an idea of the probable length of the depression and of the factors that are likely to bring about recovery. The major depressions of the past in this

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SUITING THE PLANT

+ To the Preparation Job

By J. B. MORROW

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BEFORE deciding on the technical requirements of a cleaning and preparation plant it is necessary to make a survey of the markets into which the coal from the plant is to go, in order to find just what kind of coal is desired. In a commercial operation the economic problems of coal cleaning and preparation and the marketing of the product outweigh technical considerations.

Unfortunately, no section of the public has a positive standard on which to base the acceptability of a coal, but the probable attitude of any group of consumers can be judged in advance by its criticism of the service already rendered. The designer of a plant to prepare coal for the market, the builder, owner, and operator of one will be wise if he endeavors to learn from the market reactions to his own or similar products just what the particular public he is serving will demand.

That public is not always best pleased with the purest coal submitted. It may be more greatly concerned about a flaky lamination $\frac{1}{16}$ in. thick on the face of the coal than it is about almost invisible impurities well distributed through the piece, or about lenses of pyrite hidden in the heart of the lump that only some specific-gravity test would disclose or washing remove. It has been said that someone picked out for rejection in a consignment of Illinois coal the worst pieces he could find and analyzed the aggregate and then made an analysis of those that were left, only to find that he had rejected the better coal and retained the less desirable. But was that true? The market recognized the visual test and would question any other, even though better, whether a calorific, an ash, or a specific-gravity appraisal.

So long as the public is thus minded it will be necessary to hand-pick coal of the larger sizes, breaking down the coal that has the poorer external appearance. In fact, much good coal is wasted in the reject from the modern picking table. Broken down and washed, it will yield 60 per cent of clean coal for the market. It may be as much as 80 per cent in some instances, for the cause of the rejection usually is only a mere skin of shaly lamination that raises the specific gravity but little, rarely enough to cause rejection in mechanical cleaning, unless an unusually low specific-gravity cleaning is provided.

This article by Mr. Morrow is the first of a series by coal operators, consulting engineers, and the editorial staff of *Coal Age* discussing the fundamental problems of modern coal preparation. The next article to be published will cover structural and construction problems in building modern coal-preparation plants. Among the other questions which will be treated in this series are: materials handling technique, electrification, power transmission, refuse disposal, maintenance, blending and mixing, crushing, re-treatment, dewatering and drying, dust recovery, chemical and physical control, screening, and the redesign of obsolete plants.

—The Editors.

The force at an anthracite cleaning plant frequently hand-picks the product of the cleaning unit so as to remove "cappy coal," or treats the product either on a spiral or a jump-the-gap picker so as to remove the flat and shale-faced pieces that are clean enough within and as a whole to give the required heat on burning, but which have the dirt so painfully disclosed as to arouse the ire of the purchaser.

Laminated coal in a rising current is likely to be lifted, because of the large area it exposes to the upward movement. Where this form of motion is not marked, the laminated coal will be stratified solely by its relative buoyancy as compared with round coal. In almost every form of wet or dry cleaner there is an upward movement of the water or air somewhere in the process of cleaning, and the laminated coal is lifted unduly. However, in such parts of the process as result in almost horizontal propulsion, the laminated material tends to drop and drag on the bottom and so to remain below, permitting the round coal to bound freely over it.

Sometimes, because of upward currents or because of an internal purity that compensates for the external boney cap, all of the laminated coal is not dropped and then some hand-cleaning may be necessary. Crushing and re-treating of this coal and of the middling reject saves most of the coal, but, on account of the reduction in size, does not salvage by any means as large a proportion of its entire value as it does of its weight.

But, to return to the question of market, it is necessary to learn with just what coal the product of the new cleaning and preparation plant will have to compete. It is not enough to know the kind of coal a consumer company will accept from its own mine or cleaning plant, because that company may be averse to leaving its inferior coal underground, or may have an inferior coal area, or again may be unwilling to go to the expense of installing a washing plant, if it has none, or a better one if it is already equipped. In such cases all it can do is to stifle complaint. But the commercial plant, if it is to do business with this company or another in the same industrial field, must be ready to make a class of coal that will induce the electric, gas, railroad, or metallurgical company, whichever it is, to discard its own coal as to get the benefit of the lowered freight rate per thermal unit and a fuel of better quality.

STANDARDS of quality may be difficult to determine. Any consumer will declare that he desires no ash or sulphur in his coal. He knows he cannot get what he would desire. In fact, he will lower his standards almost to any degree if none of the coal he can get will come under more reasonable specifications. Consequently, while he is striving for the unattainable he is willing to compromise, and though he knows he has to take less than his ideal, he is reticent to state just what concession he is willing to make for fear that he will concede more than is necessary.

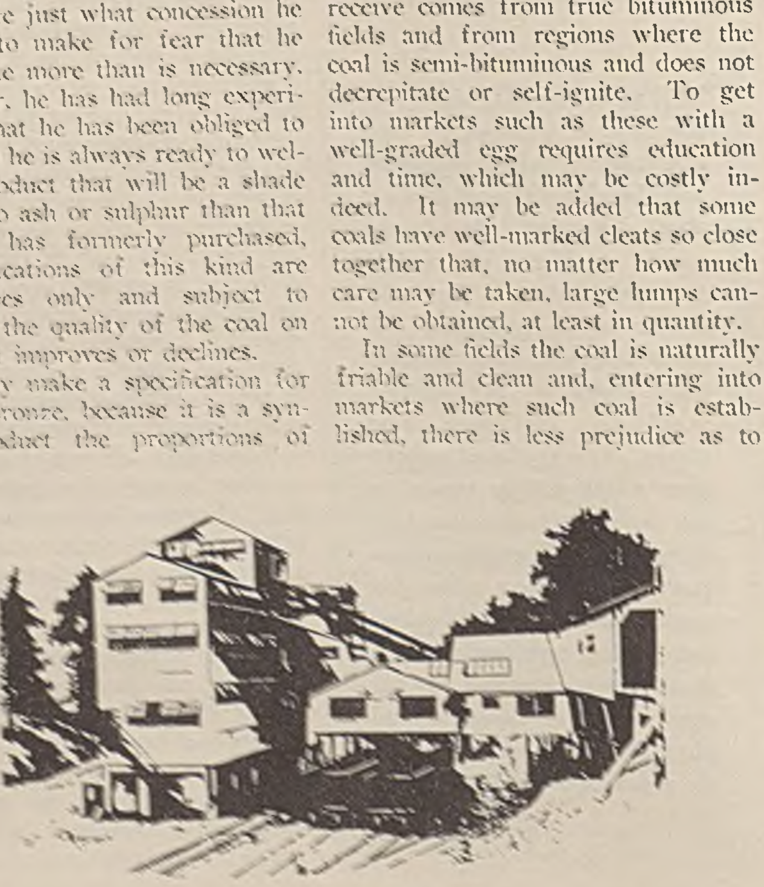
However, he has had long experience of what he has been obliged to accept, and he is always ready to welcome a product that will be a shade better as to ash or sulphur than that which he has formerly purchased, but specifications of this kind are compromises only and subject to change as the quality of the coal on the market improves or declines.

One may make a specification for brass or bronze, because it is a synthetic product the proportions of which can be varied at will, but with coal there are limitations, and the specification is based largely on what the purchaser may reasonably hope to obtain. For this reason it is difficult to say just how much sulphur and ash there may and should be for the metallurgical or the gas market.

It is necessary also for plant managers and designers to know what size of coal the market demands, so that in preparation—for preparation is not wholly or even mainly cleaning —this may be kept in mind. There are markets which demand large coal, partly because the largest coal they have had in the past has happened to be the cleanest. Sometimes the large coal comes from the purest part of the seam. That is merely a coincidence, one that is rather strange than natural, for the impure part of the seam usually gives the largest lumps, but when men have been in the habit of finding size and purity combined they naturally think these two qualities have a universal connotation, and it is difficult to induce them to believe that egg may be just as clean as, or cleaner than, lump.

Others using a coal that decrepitates and spontaneously ignites, as do the lignite, sub-bituminous and low-rank bituminous coals of the West, naturally prefer that the coal they purchase shall be large. They will demand this even if the coal they receive comes from true bituminous fields and from regions where the coal is semi-bituminous and does not decrepitate or self-ignite. To get into markets such as these with a well-graded egg requires education and time, which may be costly indeed. It may be added that some coals have well-marked cleats so close together that, no matter how much care may be taken, large lumps cannot be obtained, at least in quantity.

In some fields the coal is naturally friable and clean and, entering into markets where such coal is established, there is less prejudice as to size, and a well-prepared egg may find ready acceptance.



It stands to reason that the larger sizes of coal should be freer of extraneous matter than the smaller sizes, because it can be more clearly seen and removed. The anthracite field, which has had so much more experience than the bituminous coal field, has long ago recognized this. The public demands less bone in its large coal, and indeed mechanical equipment usually cleans the large coal with more effectiveness, even when the sizes are cleaned together. The lumps seem to be cleaned at a somewhat lower specific gravity than the finer material. Thus the sink percentage with 2½x4-in. coal may run 0.5 per cent; with 1x2½-in. coal, 1 per cent; and with 0 or ⅜-in. to 1-in. coal, 2 per cent.

ANTHRACITE operators fully realize that cleaning cannot be absolute and have provided certain modest tolerances, such as have been set up in almost every industry, especially those that have to do with the output of natural and not synthetic products, though, even with the latter, tolerances are not unknown. The bituminous coal man, however, either sells a coal cleaned only in the mine or one that he declares, by implication at least, is absolutely clean. Such a pretension only makes trouble. The doctrine of probability, or chance, in the behavior of a human being or a piece of coal when the latter is being inspected, mechanically cleaned, or sized and the irregularity of feed should be given some recognition.

A momentary inattention of the picking-table operative, a misleading presentation of the piece of coal, of which only one face is in full view, the distraction of the eye in the case of hand-picking, and the various conditions in the coal from the mine as to ash content and rate of feed in the case of mechanical cleaners make 100-per cent performance unlikely.

In the anthracite field coal is frankly sold on visual inspection—the ground on which it is accepted or rejected. Bituminous coal is not so sold but rather on heat value and ash content, and yet for domestic use it is judged by visual standards more than by any other factor. It seems that it should always be sold on precisely the same grounds as are used in determining its acceptability on receipt.

Similarly, in the anthracite region there are tolerances as to size, because the operator cannot prepare his coal to any exact size without undue breakage and excessive screen area, or even then.

Bituminous operators should specify and demand similar tolerances, for in practice they will have to take them whether the purchaser likes them or not, and as there will be segregation in the car, much of the undersize will be found in the hopper and will greet the purchaser as the doors are lowered for his inspection. The presence of this fine coal is sure to cause complaint from the purchaser which will be unusually difficult to combat, for was not this a consignment of sized coal and, as the purchaser understands the expression, that means without any undersize whatever. He should be obliged to realize by the actual wording of his contract, or by the trade practice of the region from which the coal comes, that in practice there must be undersize—coal, that is, that adheres to and rides on coal of larger size, coal that blinds the screen, and coal that has one diameter much longer than the other and, therefore, screens with difficulty.

Hand-cleaning, carefully performed, may produce a coal that visually accords with standards, but the extraneous matter that may be left in cleaning will run higher in ash than the sink from the cleaned coal. A picking table should be run so slow that it will not exceed the ability of the picker to clean the coal. The rate of movement will depend much on the size of the coal and on the character and cleanliness of the coal to be picked. In any case the coal should not be more than one layer deep for satisfactory operation, and with large lumps the operative should be able to see the side of the lump as well as its upper surface.

BEFORE preparing to build a cleaning plant a large number of analyses of the coal in the seam by layers should first be made, so as to see if some of these layers should be eliminated, for some coal is of such a high inherent ash and sulphur content that no cleaning can undo the unkindly processes of nature. The best that can be done with such coal is to leave it, preferably unmined, within the workings as either roof or floor coal, for often, but not always, such unimprovable coal is found either at the top or bottom of the seam. However, in some cases by cleaning these layers, or a part of them, with the other portions of the bed it may be possible to use them.

J. B. Morrow

Some of the coal may be both very fine and clean. That is true of some fragile coals. In loading the coal, moreover, it may not be contaminated by scale from the roof or floor but come to the cleaning plant in excellent condition for the market. In that case it may be well to leave this part of the coal entirely unprocessed. It can be screened out and added to the coarser coal after the latter has been cleaned. Dry coal, however, it may be said in passing, in byproduct ovens has the disadvantage of exploding and blowing back when charged and of producing an undue proportion of carbon on the top of the coke column.

One can scarcely take too many samples in a mine the product of which is to be studied for cleaning. A good practice is to take 60, or even 100, and to take that number from each of the five or six strata of which the seam is composed, if there is any such a number of layers. In each of these analyses the facts are determined as set forth in the table.

The "Raw Coal (actual)" is recorded in the "Per-Cent-of-Weight" column as 100 per cent, and the "Raw Coal (calculated)" is the sum of the percentages in the last three horizontal lines of that column; that is, it is the sum of the float at 1.40 specific gravity, the coal between 1.40 and 1.60 specific gravity, and the sink at the latter density. The calculated figure is used solely as a check on the accuracy of the determinations.

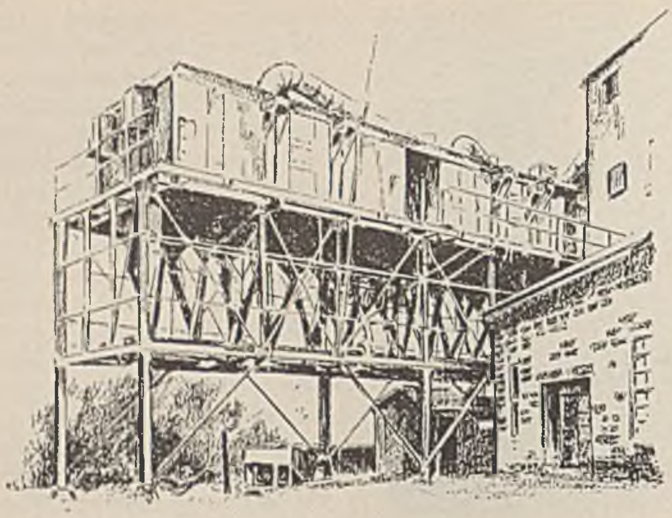
It may seem strange that only two gravities are taken instead of many within that range, but it has been found quite possible to interpolate values. The ratio between the ash in the float at any given gravity and the ash in the sink at that gravity lies between (1) the ratio of the ash in the float at 1.40 to the ash in the sink at that gravity and (2) the ratio of the ash in the float at 1.60 to the ash in the sink at that same gravity and is in regular proportion to the gravity value.

Hence, given the percentage value of the ash in the float, it is possible to find by proportion the specific gravity and the quantity of ash in the reject and also the specific gravity at which the coal must be floated to get the required ash percentages in the float. This system has had extensive test with a large range of coals and been found to accord with the facts. From this knowledge may be obtained a figure for the percentage of ash in the float for any given recovery without direct test.

IT IS well to know the analysis of the ash, especially when preparing a metallurgical fuel; for example, the calcium oxide percentage is important. Calcium carbonate is a helpful body in the blast furnace. In fact, it always is added as a flux, if not present in sufficient quantity already in the iron ore. Why object to it then in coal from which coke for the furnace is to be made? Just for this reason: the calcium carbonate reduces to calcium oxide in the oven, but as soon as it is sprayed with water in the cooling of the coke it slakes and expands and so may make crevices in the coke that will cause it to spall, making excessive fines, or will weaken

Form for Study of the Coal in a Mine Preliminary to Cleaning

					Volatile Content		British Thermal Units		Analysis of Ash				
Part of Coal Tested *Top Breast*	Per Cent of Weight	Ash Content	Sulphur Content	Moisture Content	Air Dried	Moisture and Ash Free	Air Dried	Moisture and Ash Free	SiO_2	Al_2O_3	Fe_2O_3	CaO	Fusion Point
Raw coal (actual)	100.0	4.7	1.20	...	....	....	.....	.....	....	....	....	...	....
Raw coal (calculated)	100.0	4.6	1.14	...	....	....	.....	.....	....	....	....	...	....
Float 1.40 sp.gr.	97.4	3.7	1.01	1.1	37.7	39.6	14,550	15,280	47.8	35.5	13.3	2.6	2,520
Float 1.60 sp.gr.	1.0	19.8	2.71	...	....	....	.....	.....	42.4	24.0	16.8	9.1	2,180
Sink 1.60 sp.gr.	1.6	52.6	9.16	...	....	....	.....	.....	39.0	20.5	26.9	7.8	2,310



it when it has to bear the burden of the weight in the furnace. The relation of the calcium-oxide content to that of the silica also is suggestive of trouble from fusing.

Today there is a disposition to ask not only what is the softening temperature of the fusion cone but what is the fluid temperature, so perhaps it would be well to find, tabulate, and consider both when making the survey of the seam. As the cleaning plant rarely if ever works on an average sample of the entire mine but sometimes has to work temporarily, mainly on the product of some one part, it is well to design the cleaning plant not on average conditions but on conditions somewhat less fortunate than normal, so that with all the chances unfavorable the result desired will be attained. Thus, if the average ash content of the raw coal is 10, it may be well to base one's design on an ash content of 15.

One makes an important error, however, if one believes today that when coal is cleaned the work is done. Preparation includes more than cleaning. Some might be disposed to speak of cleaning and preparing as two separate yet co-ordinate operations, for sizing and mixing of sizes accurately and uniformly is almost as important as cleaning. For instance, for the domestic stoker it serves not at all to have the right proportions, with the coarse size in one part of the fire or in one charging and the finer size in the other. In fact, the fumes may travel back along the feed screw and make trouble if enough fine coal is not provided to prevent any such action. The caking of coal in the producer also is helped by the proper percentage of fines.

It is important, however, that care be taken that all the precautions exercised to fill specifications are not vitiated by lack of proper handling or a certain amount of rescreening at the receiving point wherever the coal is not mixed at the tipple. Unfortunately, railroad transportation is not by any means gentle. The coal is loosely laid in the car and will descend some inches in transit. As the coal in the bottom of the hopper is under a load of 500 lb. per square foot, it is natural that there will be much breakage with this weight settling down even an inch or so during the early impacts between cars. There also will be segregation, but with a mixed coal the voids are well filled, and in transit the coal, being properly bedded in fines, is not so badly broken and there is a minimum tendency to segregation.

Usually the sales engineer can devise a formula or recipe that will fill the buyer's needs. Complaints frequently arise merely from the fact that the purchaser has been buying the wrong sizes or mixtures of coal to suit his conditions.

When selecting a cleaning plant many conditions should receive consideration. For instance, it must be remembered in these days of irregular running time that depreciation during the idleness of a plant is a factor of importance. Will the plant bear up well under idleness or will there be excessive depreciation?

In planning a small cleaning plant, one should not aim for excessive refinements which can be justified only in a large plant where a big tonnage is handled by a few men. One can afford in such a small plant to let a somewhat higher proportion of coal go to bank in order to reduce the carrying charges of the installation.

Everything depends on the cost of the coal being prepared and on the size of the coal lost. Losses should always be counted in dollars, not in tons. The engineer thinks in tons, but the economist in monetary values. In building cleaning plants and in operating them, dollar losses must be stacked against dollar costs if one would build or operate with due economy. This must be remembered in sizing up a record of cleaning-plant performance.

It must be remembered that the actual cleaning equipment may represent only a small part of a complete plant. The cost of the auxiliary equipment will be found to be greater than that of the actual cleaning unit. Where this is the case, too much stress should not be laid on the cost of the latter. In a dry-cleaning plant, screening machinery is an item almost as large as tabling, and dust collection as large as either. Though the general practice is to regard the cleaning end as the alpha and omega of the tipple, today far more money is likely to be spent on dumping, loading, drying, picking, disposing of refuse, and other auxiliary services than on the actual cleaning, for the cleaning equipment has arrived at such perfection that it operates almost automatically on its part of the output.

BECAUSE of recent emphasis on cleaning, there has been a disposition to overlook other phases of preparation. One might have a cleaning plant that would reach its objectives in every detail and yet not have a tipple or breaker that would give satisfaction. To meet market demands, the features of preparation other than cleaning need careful consideration, both in design and operation.

As one wanders through a large ore concentrating plant and notes the various kinds of equipment in use, one realizes that the mill designer is employed by the company and that he selects from one manufacturer what he needs for one process and from another manufacturer what in his opinion will serve best for some other purpose, and so all through the mill and the beneficiating plant. The mill men know their ore and they know what treatment it needs. In the coal industry one manufacturer's machinery is likely to be used almost throughout. There is not so much of the selective work done by the preparation engineer that is so notably present in the layout of the concentrating plants of an ore mine.

MECHANIZATION

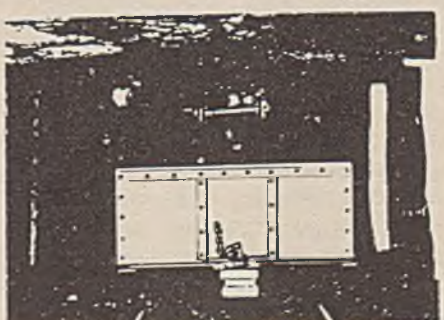
+ Developments in 1930 Marked By More Intensive Planning

ALL factors considered, mine mechanization in its broad aspects made satisfactory progress in the bituminous industry during 1930. The activity was more notable for its gain in constructive trends toward the supplementing and balancing of equipment—for a better product first and for lower over-all costs last—than for its contribution to production volume. There was an abundance of evidence to support the belief that operators have learned the lesson that successful mechanization does not stop with the installation of equipment for loading coal but it means other necessary improvements below and above ground. The year, therefore, marked the beginning of an era of sounder mechanization policy.

One operator prominent in mechanical mining explained the situation as follows: The year of 1930 emphasized that mechanization is not a panacea for all operating troubles. In eliminating some difficulties, it introduces others of a more serious nature. The line of least resistance certainly does not point toward mechanized mining. Installations already made of mechanical equipment, partial and complete in large and small mines, make the whole field of mechanization look unduly attractive. They do not, however, reveal the real difficulties which the average operator will encounter in his power plant, his tipple, his haulage equipment, operating supplies, supervision, etc. The past year sobered the operator pursuing mechanized mining. He has taken an inventory of his favorite schemes and ideas, has discarded the impractical, and stands ready to progress on a more substantial basis.

Internecine competition and the competition of substitute fuels from without is beginning to influence the mechanization policy of shrewd operators. Faced with a loss in output which made the development of additional capacity of no purpose, they showed a tendency to perfect existing operations rather than to enlarge them. This step toward improving efficiency without swelling production promises to be one of the most fruitful germs of stabilization planted in 1930.

Except in a few isolated cases, competition from the expansion of gas distribution was not sufficiently felt to have had much bearing on mechanization last year. But it is a power which must be reckoned with in the future. To fight effectively against this new element in its markets, the industry is compelled to modernize its plants with increasing speed. This and the fact that the scope of requisite physical improvements is wide call attention to the urgency of immediately working out plans for the financing of new equipment. To stimulate the mechanization advance, it has been suggested that the manufacturers develop deferred payment plans, as a few already have, to assist responsible buyers. Another proposal made is that the power companies, which profit from mechanization, be asked to underwrite credit papers. A third possibility is commercial credit services.



Several companies were added to the list of those who have been paying bonus or incentive wages. But even with these additions the list still embraces relatively few names. One company reports constructive results from the functioning of a group premium plan based upon a fair daily man-shift production. All men employed in and about each individual machine are considered in the group and premiums are computed over the semi-monthly pay period.

In the case of shaking conveyors, with the loading crew undercutting, drilling, shooting, and timbering the places, a premium is paid equal to half the established labor cost per ton. The aggregate premium for a period is pro-rated between the men on the basis of man-shifts actually worked by each. No attempt has been made to enforce the earning of a premium; yet about 44 per cent of the tonnage loaded by this machine type is on the premium basis. The plan has yielded daily individual worker premiums ranging from 20c. to $3. For the first half of December the average premium was 86.8c. per man shift and covered 45.6 per cent of the tonnage coming under the premium. The machines are numbered, and earning or non-earning of premiums for each is posted. As a further means to set forth clearly the reward for diligence, premiums earned by individuals are paid by a separate check.

At a certain plant, where loading machines are double-shifted, great strides have been made in personnel training and direction. Standards of workmanship have been set up and these are enforced. Various activities have been analyzed and respon-

sibilities and authority for each exactingly placed. Prints are furnished on important jobs and these are supplemented by written instructions. Verbal orders have been reduced to a minimum; written instructions are the practice all the way down the line.

Discussion continued on the relative safety of mechanized loading with respect to hand loading, but no agreement was reached. A research study of this problem is now under way at the University of Illinois. At the Washington meeting of the American Mining Congress it was proposed that this organization gather statistics to decide the question. J. D. Zook, president and commissioner of the Illinois Coal Operators' Labor Association, stated at this meeting that such figures should be collected by government authority. A recommendation was made that the figures should be broken down by occupations for a clear picture of the results of mechanization on safety.

SAFETY with respect to machines received serious attention in Utah. During the year the State Industrial Commission issued an order that after Jan. 1, 1932, only equipment approved by the U. S. Bureau of Mines may be used in "gassy" mines in Utah. Under the order, operators of "gassy" mines are required to have an electrician keep in daily contact with equipment at the working face. Repairs must be made above ground and the electrician must make a daily record of equipment in use.

Last year the U. S. Bureau of Mines was asked to pass judgment on the permissibility of more equipment than in any previous year. It issued 36 approvals which covered practically every major machine type. For further details see p. 78, this issue.

Variations in daily production have been taxing the ingenuity of management at mechanized mines. More and heavier equipment, together with extraordinary facilities for maintaining it, has added much to capital investment, so that the advantages gained by high degree of mechanization are discounted by idle time. Planning and scheduling of operations are the ways out of this difficulty, and reports have come in of progress in these channels. Operation control calls for laying out the work of every man, from machine runners to track and timber men Supervision must be more intent and companies no longer countenance superficial observance of processes by foremen.

In the working out of plans, however, it has been discovered that because of the principle of diminishing returns a change which benefits one phase of operation may react to the disadvantage of others. Running time generally, but not always, is a true measure of efficiency. Why have two gathering locomotives, in the extreme case, behind a loading machine? Or why a cutting machine at every narrow, conveyor-mined face? The answer is simply that practical efficiency sometimes outstrips the theoretical.

At one plant where supervision and scheduling have been carried to refinement, section lines are distinctly marked. Each section has a foreman and the foreman is held absolutely accountable for whatever transpires in his territory. Section headquarters is connected with a dispatcher's office by telephone for centralized control of transportation and other mining activities. At this plant power cost has been reduced 1c. a ton through meter control of peak loads. Gathering locomotives are operated in a sequence fixed by the dispatcher and peak loads are thus minimized. An unusual reduction in maintenance cost has rewarded this practice.

Where due regard has been paid to scheduling, the proportion between generator capacity and connected horsepower has been kept surprisingly low. Spreading operations over off-peak hours has become increasingly important and desirable and is gradually bringing about a transition to true multiple shifting. Incidentally, double shifting remains confined to comparatively few mines, chiefly to long-face work, development, and extraction of long-standing pillars.

That thin coal bulks less as the bugaboo of present mining was made manifest during the past year. Machines, particularly conveyors, enlarged the area and lowered the seam thickness limits of economical mining. Now, coal down to the working height of cutting machines is being taken in limited areas; recovery of 30-in. coal is relatively common. Avoidance by modern methods of yardage and deadwork penalties, the fact that much of the thin coal left in previous operations is of high quality, and demand for quality rather than volume production are the determining factors. In some cases productivity on the basis of man-shifts has been more than doubled by the use of machines in thin coal. Recent improvements in equipment design, especially the lowering in height of mining machines, locomotives, and mine cars, have greatly accelerated this activity.

IT IS said that the track-mounted cutting machine is the logical successor of the shortwall cutter, just as the latter succeeded the breast type; it also is believed that the superseding of the first type for the second will be at a rate faster than was that of the second for the third. At any rate, track-mounted cutters are being installed in all fields, in thick coal and in thin. Readjustment of wage bases for cutting-machine runners has been a stimulus to the introduction of these machines.

But in Indiana labor has held out a hand to stay this progress by objecting to the use of this machine in connection with hand loading. By contract the machine is allowed in combination with machine loading only. It is an ill-advised gesture attempting to thwart mechanization, which cannot be halted when economic forces decree its consummation. Fortunately, labor in general takes a constructive viewpoint in the matter.

Several new types of loading machines were introduced. One is the Clarkson track-mounted loader, which uses belting, traveling in 24-in. I-beams, instead of metal flights in its conveyor construction. Gathering arms mounted on chains crowd the coal onto the front conveyor. The

Myers-Whaley "Automat" is a new coal-loading machine incorporating a one-piece shovel which is operated by two sets of driving rods, one for moving the shovel back and forth and the other for tilting the shovel to discharge position (*Coal Age*, Vol. 35, p. 136). In the light-weight class appeared the Jeffrey 44-C loader (*Coal Age*, Vol. 35, p. 465), and the Utility semi-loader (*Coal Age*, Vol. 35, p. 413), both of which in operation are supplemented by some degree of hand shoveling.

THE tendency in pit-car loader design is toward heavier and more rugged construction. Attention to permissibility of equipment continues and much attention has been given to the front or loading end to allow two or more men to shovel without interference. Changes in conveyor construction involved utilization of more durable materials and other refinements more than the development of new types. Fairfield Engineering Co. brought out a new sectional drag type face conveyor designed for speedy moving around pillars (*Coal Age*, Vol. 36, p. 10).

Pillar extraction with mobile loading machines cannot yet be said to be a general practice. In the Mid-West, where there is a concentration of these units, little pillar coal is taken. In many mines elsewhere, the machines are applied only to partial extraction of pillar coal. In view of this situation, it is interesting to note that two companies in Pennsylvania have inaugurated machine loading on the open end of pillars, a method which appears as inviting as long-face work with conveyors from the standpoint of theoretical simplicity and yield per cut. The roof in both instances can be described as fairly sound.

One of these companies by open-ending on an oblique has succeeded in establishing a 1,450-ft. pillar line under a cover of 350 ft. The other company has been working pillars open-ended at an angle of 75 deg. off the center line of face rooms as measured at the pillar point. It was found, however, that in pillar extraction on an angle to the slips of the seam, the coal cannot be readily released from the solid. To overcome this difficulty, a new layout has been started in which the pillar ends will parallel the seam face and yet be at an angle of 45 deg. to the room course at the point of smallest angle.

The projects of these two companies, both of which are considered experimental, should shed some light on the degree to which rapid extraction of pillars affects roof control in mechanical loading. Will results be as favorable to loading machines as they have been to conveyor extraction of pillar coal by open-end methods? The real test, of course, will come after a large area has been pillared.

One of the new mining layouts for mechanical loading which took on prominence during the year is the checkerboard system developed at a mine in Indiana. In this system rooms are driven 30 ft. wide, leaving 40-ft. pillars which are pocketed by 20-ft. crosscuts on 40-ft. centers. The 20-ft. stumps remaining are left to hold the roof and are not recovered. This arrangement allows 40 per cent of the coal recovered to be loaded into trips of cars (*Coal Age*, Vol. 35, p. 85).

In conveyor mining, operators have grown more partial to room-and-pillar systems—sometimes with modifications—at the expense of typical long-face layouts. The former have proved themselves, but in general the latter have not. Economies from long faces appear about as far off as ever in the past, except in scraper mining, where extended faces have given best results.

One company in Maryland continued the successful use of steel-arch timbering under broken cover in two of its Big Vein seam mines. This arch is shaped like an inverted U and the ends are rested on small steel plates on the floor of the heading. Hardwood boards, sometimes treated with preservative, are used as lagging. In cross-section the member is T-shaped, 3 in. broad and 2⅝ in. deep, with a thickness of ⅞ in.

Of all its applications in this country, the merits of the collapsible steel prop have perhaps been seen to best advantage in long-face layouts. Where it has been used systematically in this kind of work it is generally accepted as a good thing. A better recommendation could hardly be given to urge its use, if not in pillar extraction, in the driving of rooms and entries, where demands are less severe. If for nothing else, it has its use for keeping roof safe at the face while the men and machines are at work. A company in Pennsylvania keeps a set of screw jacks on loading units for this very purpose.

It is to be regretted that the industry as a whole has made so little headway in the utilization of steel as a substitute for wood in mine timbers. Mechanization has plainly shown that the poorer grades of wooden timbers cannot be safely used and that the better grades are too expensive. These two factors will eventually bring about wide use of recoverable steel roof supports in this country, as they already have across the seas (see p. 82, this issue).

PNEUMATIC coal picks met with increasing favor largely in thin seams for breaking down, shearing, and undercutting coal. One company has a large number of picks in operation for undercutting. In Alabama mining these tools have increased the productivity of face men roughly one-third (*Coal Age*, Vol. 35, p. 75). Their weight is about 25 lb. and their strokes about 3,000 per minute.

During the year the U. S. Bureau of Mines issued an approval plate for a one-man electric drill of German design for 250-volt d.c. service. A few electrically operated rotary coal drills were installed in the anthracite region. Also, a power-driven expanding-barrel type of wedge, used in place of explosives for breaking down coal, was developed (*Coal Age*, Vol. 35, p. 357).

Mine-car capacity in new installations has been steadily increased. Experience has shown that under favorable circumstances a car costing, say, $250, may replace a serviceable car costing half that amount and pay for itself in as little time as a year. The gain is through all-around improvement of operations. For best results, it has been shown that cars must be designed expressly for the specific job.

An Acknowledgment

This, the Twentieth Annual Review and Progress Number, is the result of co-operation given the editors by men of the industry and associated agencies. It is fitting that this invaluable assistance be acknowledged. Therefore, appreciation is here expressed to the executives, managers, superintendents, and engineers in the industry itself, and to the individuals in related activities who contributed so generously of their time and effort. So many joined in the completion of this work that it is not possible to mention all by name.

MACHINES HELP ANTHRACITE

+ Regain Lost Markets

IN the drive for greater efficiency to enable anthracite to hold its competitive place, producers are closing down high-cost mines and concentrating on increased tonnage from fewer operations. By this method of attack, the industry is seeking to lower overhead, to improve the working time and output of employees without change in tonnage rates, and to assist the employees in their work by the installation of mechanical devices. As a result, about ten mines have been closed in the Northern field. There is a disposition also to operate breakers as large central units, working them more than one shift daily. These changes, by increasing tonnage, or at least by sustaining it, should prove highly advantageous to the mine workers in the hard-coal area.

Probably the first companies in the Northern field to introduce shovels for loading rock were the Price-Pancoast Coal Co. and the West End Coal Co. The first company at one time had as many as six shovels of the Hoar type at work at Pancoast cleaning up fallen chambers and the second had at West End a Myers-Whaley shovel cleaning gangway. On the culm bank at the latter mine it had a Joy loading machine which on some days handled as much as 500 tons. At Pancoast also there were four scrapers with $\frac{3}{4}$-yd. Delaware & Hudson buckets taking coal out of the gangway in the Dunmore seam and removing coal from pillars.

There are also thirty or forty shaker chutes, some Vulcans and some Eickhoffs. At the West End colliery there were three or four scrapers with buckets of the same type as those at Pancoast. Pancoast also had some Ajax loaders for using at the end of shaker chutes and a Sullivan tugger hoist for unloading timber at the shaft. These mines were then practically all in pillar work, though in the surface bed which is 4 ft. thick there was some room coal. The Scranton Coal Co. also has used several shaking chutes of its own and other patterns.

A leader in the movement to use loading machinery is the Pittston Co., Dunmore, Pa., which introduced the equipment it uses largely with the idea of eliminating the handling of rock in low places. This company has five Meco conveyor units with one gathering belt and six auxiliary shaking conveyors, one of these units with seven conveyors, and one with five conveyors; three Gallatly conveyors, seven $7\frac{1}{2}$-hp. Sullivan scrapers, twenty-two 25-hp. Sullivan scrapers, three Meco shakers, twelve Meco room-belts, five Pittston cross-cut- conveyors, and four Pittston shaking conveyors, or 105 units in all, reckoning each conveyor as a unit whether a main conveyor or an auxiliary thereto. Other scrapers and conveyors are in use by contractors. These are not included in this summary.

Shaking conveyors are doing excellent work at the mines of the George F. Lee Coal Co., Plymouth, Pa. At the beginning of the year it had one Northern pit-car loader, and during the year it added three more. These are loading 120 tons of rock per day. In this mine there are 37 conveyors of various types which produced 95,000 tons last year, 65 per cent of the aggregate tonnage loaded. This company it was that first introduced the pit-car loader into the anthracite region, but early in 1930 the Lorain Mining Co., Scranton, Pa., had one for use in the mines of the Glen Alden Coal Co.; the Hudson Coal Co. had three, and the Lehigh Valley Coal Co. one.

At the mines of the Lehigh & Wilkes-Barre Coal Co. much use has been made of shaking conveyors. One of its mines has as many as 70 of these units at work. It has also one belt conveyor. It expects to open up rooms in an area 1,200 ft. wide. Pillars will be left to prevent subsidence. Each of these rooms will have a shaking conveyor which will discharge into an entry belt conveyor so as to provide for intensive operation and to eliminate almost entirely the removal of rock, for the seam is only 4 ft. 4 in. thick.

Other companies using shaking conveyors are the Jeddo-Highland Coal Co., of Jeddo, Pa., and Madeira, Hill & Co., of Philadelphia, Pa. The latter had thirty conveyors in operation at the Colonial mine at the beginning of 1930 and added one other in that year. These conveyors delivered 140,000 tons, or 20 per cent of the output. There is also one self-loading machine loading about 30 tons of rock daily. Locust Mountain Coal Co. has six shaking chutes in operation, but removed five during the year. It loaded 18,000 tons, or 8 per cent of its coal in this manner.

Madeira, Hill & Co. has at Colonial Colliery 34 scrapers, three of which were added during the year. These units loaded 170,000 tons, or 23 per cent of the tonnage loaded. At the Locust Mountain Coal Co.'s plant six scrapers were in operation at the opening of the year 1930, but five were removed. The output handled by these scrapers for the year was 37,000 tons, or about 16 per cent of the tonnage. Pine Hill Colliery had six scrapers at the beginning of 1930 and none at the end. They loaded 33,000 tons, or 5 per cent of the production of the colliery.

The Philadelphia & Reading Coal & Iron Co. has used shaking conveyors for years at several of its mines, especially at the Alaska Colliery. At this mine the company has been operating the V-system with face units bringing the coal to room conveyors and these in turn delivering to an entry unit for dumping into a gangway conveyor for delivery into cars.

Preparation has made progress, even in plants that have not made radical revisions. Thus Madeira, Hill & Co. have found ways of lowering their water consumption, urged thereto by the prolonged drought. Hydrotators have been installed at the plant of the Hazle Brook Coal Co., one Hydrotator receiving the coal from the main fine-coal shakers and washing it. The clean coal is screened into rice and finer, and the rice goes to the cleaned rice bin. The barley and No. 4 buckwheat go to the second Hydrotator and are washed again, giving cleaned coal of those sizes. The refuse from both Hydrotators goes to a concentrating table and is rewashed. The reject goes to the bank and the cleaned product from the concentrator is put back through the breaker.

AT THE Walnut St. Power Plant of the Pennsylvania Power & Light Co., at Harrisburg, Pa., a Hydrotator is cleaning fine coal which is mostly No. 4 buckwheat, but runs from $\frac{1}{8}$ in. down. It removes sand, slate, and bone. An interesting feature at this plant is the Bonnot piano-wire screen for removing wood, roots, and other rubbish. This screen is 4 ft. 4 in. long and has no cross-bars, but depends for its support entirely on the tension with which it is strung. The wires, of about $\frac{1}{16}$ in. diameter, are attached to a strong frame with pins which are tightened with a socket wrench. These screens, though stationary, do not "blind." They were originally used for fireclay, but should do even better work with coal.

Several pickers of the type developed by W. S. Ayres at Hazleton, Pa., have been in use. They work on the principle that coal will roll on a sloping belt, whereas boiler ashes and flat slate will not. At the Pine Brook Colliery, Scranton, Pa., a picker of this type has been used to prepare fresh-mined coal as it comes from the jig, removing flat slate.

During the year 1930 Chance equipment having a capacity of 2,850 tons per hour was placed in operation in the anthracite field. The Philadelphia & Reading Coal & Iron Co.'s Locust Summit Central Breaker, at Locust Summit, Pa., leads them all with a capacity of 1,000 tons per hour. Next is the Powderly breaker installation, in Carbondale, Pa., belonging to the Hudson Coal Co. It has a capacity of 800 tons hourly. Four other installations were made, accounting for the other 1,050 tons-per-hour capacity.

Pittston Co. in 1930 added twelve Menzies hydro-separators; the Susquehanna Collieries Co., three; the Glen Alden, two; Tamaqua Gap Coal Co. and the Lehigh Valley Coal Co. each one, or a total of 19 hydro-separators, with a capacity of 900,000 or 1,000,000 tons annually. In this brief summary reference may again be made to the Hydrotator, which has been placed in nine units at seven plants with a total capacity of 300 tons per hour. All these Hydrotator plants are washing buckwheats of various sizes, but the washing of larger sizes may be anticipated.

MOST of the companies reporting drove much rock tunnel during the year and declared their intention to drive more during 1931. The Repplier Coal Co., of Buck Run, Pa., in 1930 drove 15,330 ft. of rock tunnel, 1,180 ft. of rock chutes, 2,520 ft. of rock gangway, and 400 ft. of water tunnel, and has projected for 1931 two inside slopes, each 300 ft. long, 800 ft. of rock gangway, and 400 ft. of tunnel. This large quantity of rock work, however, is unusual.

George F. Lee Coal Co., of Plymouth, Pa., drove 500 ft. of rock tunnel only and expects to grade 1,000 ft. of rock, cutting it to a depth of 8 ft. to improve haulage. The Lehigh Navigation Coal Co. drove 19,500 ft. of rock tunnel and 28,600 ft. of rock chute in 1930. It has a projected program for the year 1931 of 20,000 ft. of rock gangway and tunnel and 30,000 ft. of rock chute.

Madeira, Hill & Co. in 1930 drove at four collieries 5,200 ft. of rock tunnel and 10,900 ft. of rock chute. The Pine Hill Coal Co. excavated 1,767 ft. of rock tunnel and 205 ft. of rock chute. These are representative of the large amount of rock work in the anthracite region that adds so greatly to the cost of operating anthracite mines, costs that are almost entirely unnecessary at bituminous operations.

During the latter part of the year a new stripping was opened by Madeira, Hill & Co. that will replace the Morea colliery stripping started in 1925, which now is nearly completed. The latter colliery was operated by the more usual method, with locomotives and cars. In every way, however, it represented the best practice, having electric shovels, 50-ton locomotives, and 30-yd. standard-gage air-dump cars.

The new stripping is being operated on what are now principles for this class of work. The clay overburden will be removed with caterpillar tractors and heavy-duty construction caterpillar wagons. The use of this equipment with reasonably short hauls to the refuse disposal banks shows an economy that cannot be obtained with locomotives, steel cars, and trackwork. The caterpillar tractor with its 8-cu. yd. wagon and one operative eliminates all trackwork. The operative builds his own bank and dumps the burden while the machine is in motion. The use of this type of equipment in certain phases of stripping operations is growing rapidly.

IT MAY be well to give an account of the operations of the Jonathan Coal Mining Co., which has eighteen coal plants taking coal from the Mahanoy, Shamokin, and Swatara creeks and the Schuylkill, Lackawanna, and Susquehanna rivers, with a potential recovery of about 600,000 tons yearly, though the output in the past year or two, due to business depression, has been only about 350,000 tons annually. The commercial sizes reclaimed are barley and No. 4, about one-third of the former to two-thirds of the latter.

Wilfley, Deister-Overstrom, and James tables, and one Hydrotator are used for cleaning, reducing the ash content to between 12 and 20 per cent. In all there are 46 concentrator tables, one Hydrotator, 14 supplementary sanding riffles and sluices.

PREPARATION

+ Held Wide Attention in 1930

COAL-PREPARATION activity during 1930, in cleaning, crushing, sizing, and in the incidental processes at tipples and at the more elaborate mechanical separation plants, came close to the record established for it the year before. Not all of the fields continued the 1929 pace of new construction and general improvement, but where one fell behind, another gained ground. There were recessions in certain details, but these were compensated by greater progress along other lines. The important point to note is that both anthracite and bituminous grew more cognizant of competitive situations and their responsibilities in preparation; that they are taking steps to meet them.

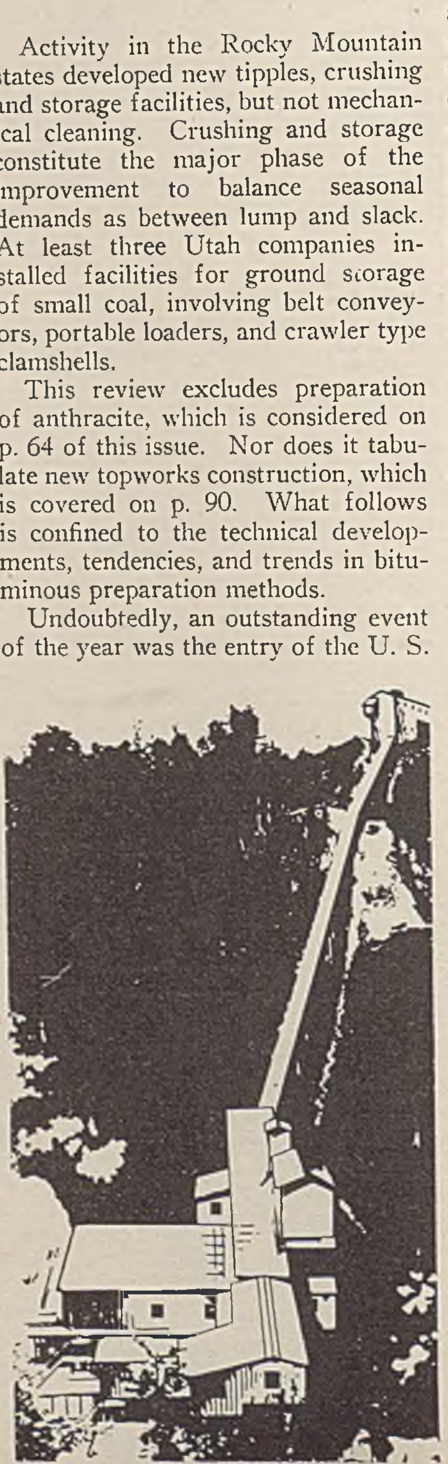
A shift took place in the focus of bituminous preparation-plant construction from western Pennsylvania to southern West Virginia. Although several new plants, one of great size, were in progress of construction in the shadows of Pittsburgh, the last year saw southern West Virginia forge ahead of its rival in the matter of new plants completed or under construction, in additions made to existing plants, and in added capacity. One new pneumatic cleaning plant was started in western Kentucky. Ohio continued its forward movement in tipple construction; a contract was let for a pneumatic plant in the Hocking field.

Rescreening plants, in many cases augmented by crushing facilities, marked the bulk of improvement in the Mid-West area. Incidentally, these practices, which were first initiated by southern Illinois operators, are spreading into every field. Though almost all Illinois operators continue interested in mechanical cleaning, not one has committed himself. Contracts were let for two washery installations in Indiana.

Activity in the Rocky Mountain states developed new tipples, crushing and storage facilities, but not mechanical cleaning. Crushing and storage constitute the major phase of the improvement to balance seasonal demands as between lump and slack. At least three Utah companies installed facilities for ground storage of small coal, involving belt conveyors, portable loaders, and crawler type clamshells.

This review excludes preparation of anthracite, which is considered on p. 64 of this issue. Nor does it tabulate new topworks construction, which is covered on p. 90. What follows is confined to the technical developments, tendencies, and trends in bituminous preparation methods.

Undoubtedly, an outstanding event of the year was the entry of the U. S. Steel Corporation into the field of modern preparation methods by contracting for two plants, one a wet and the other a dry. A subsidiary, the Carnegie Steel Co., began erection, at its Clairton (Pa.) byproduct coking plant, of a large washery for the beneficiation of coal from river mines of the H. C. Frick Coke Co. Coal transported by barges from the Bridgeport and Maxwell mines will be crushed to pass a 3-in. round-screen opening and sent to a complete Rheolaveur washing unit having a capacity of 600 tons per hour, or 12,000 tons in two 10-hr. shifts. The plant is designed with Carpenter mechanical dryers for removing moisture from the fine coal and with an adequate water-clarification and sludge-recovery system operating in a closed circuit. This plant is scheduled to go into operation in the late summer of the current year.



An important objective of this washing program, it is said, is the almost complete removal of heavy-gravity material from Pittsburgh seam coking coal. This impurity in the fine sizes is particularly harmful, causing hair-like cross fractures in the blast-furnace coke and consequently more breeze. There also will be the usual savings in blast-furnace practice from ash and sulphur reductions.

At Gary, W. Va., the U. S. Coal & Coke Co., another subsidiary of the Steel Corporation, contracted with the American Coal Cleaning Corporation for a complete pneumatic plant at its No. 8 mine, which produces Pocahontas coal. The installation incorporates four American Type R separators, two for treating 3x½-in. coal at the rate of 150 tons per hour, and two for treating 1x¼-in. coal at the rate of 90 tons per hour. A tube type dust collecting system is a part of the plant. Incidentally, the American Type R is a new separator designed to add capacity and efficiency through the use of practically all of the rectangular deck surface.

Much discussion has gone the rounds recently on the merits and possibilities of single plants combining wet and dry processes under one roof. This idea has been followed in several installations of relatively small capacity, but never in a large way prior to the erection of the Crumpler (McDowell County, W. Va.) plant of the United Pocahontas Coal Co. Details of this installation are given in the December, 1930, issue of *Coal Age*, p. 707. The loading of three mines is handled by a Link-Belt Simon-Carves washer in combination with six American type pneumatic tables, the former taking 4 to $\frac{1}{2}$ in. and the other $\frac{1}{2}$ to 0 in., with no further refinement of sizes.

Interesting, too, is the first application of the Chance sand-flotation system to the cleaning of Pittsburgh seam coal in an installation at the Coverdale mine of the Pittsburgh Terminal Coal Corporation. This plant has a capacity of 480 tons per hour and will treat egg, nut, and stoker coal.

IN the Westmoreland field, where past experience has been limited to wet tables and jigs, the Jamison Coal & Coke Co. is making two Fairmont installations of the Peale-Davis pneumatic system. The capacity of one of these is designated as 300-350 tons per hour, cleaning 5x0-in. unsized coal, and the capacity of the other is 150 tons per hour, cleaning nut and slack.

Missouri is leading the way in mechanical preparation for the Southwestern states. At Keota, Mo., the Central Coal & Coke Co. put into operation a five-compartment Link-Belt Simon-Carves unit which is preparing $2\frac{1}{2}$x$\frac{7}{8}$in. nut and $\frac{7}{8}$-in. screenings at a combined rate of 100 tons per hour. The Reliance Coal Corporation contracted with the Pittsburgh Boiler & Machine Co. for a washery of 200 tons per hour capacity using Montgomery jigs.

Mechanical cleaning last year yielded the new "Aersand" process of the Hydrotator Co. It is essentially a float-and-sink separation in a flowing stream of sand made fluid by air bubbles. The initial commercial installation was made at a Cadogan (Pa.) mine of the Allegheny River Mining Co., and handles nut size from a raw mixture of Lower Freeport and Lower Kittanning coals. Separation is made in a two-compartment unit (see Fig. 1). Raw coal is cleaned in one compartment and refuse is reclaimed in the other. Separation involves no jigging or shaking motion.

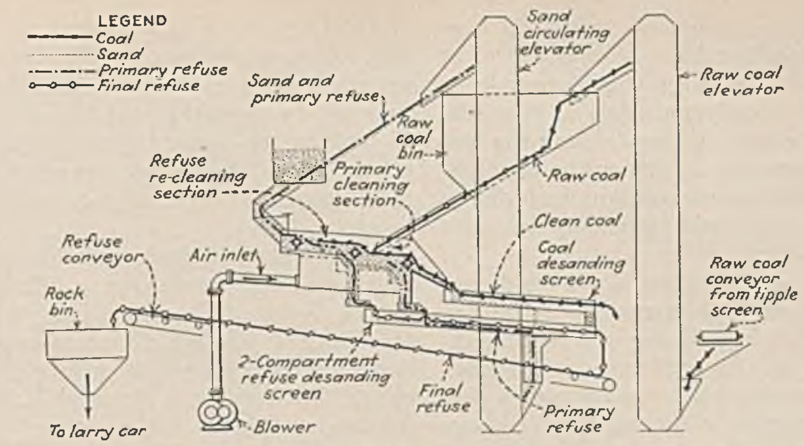


Fig. 1—Flow-Sheet of Float-and-Sink Process of Separation by Pneumatically Fluidized Sand Stream

As the raw feed is a mixture of two dissimilar coals, it varies greatly in washability. The Freeport portion is characterized by an appreciable proportion of boney, but contains only 2 to 4 per cent of heavy slate. The Kittanning fraction carries a much larger percentage of heavy slate. Consequently, the raw feed varies from 2 to 15 per cent of sink at a gravity of 1.60, which is the basis of this plant's operation. This gravity represents a compromise between the best separation points of the respective coals. Results given are 2 to 7 per cent float in the refuse and $\frac{1}{2}$ to $1\frac{1}{2}$ per cent sink in the clean coal at a gravity of 1.60 in each case. This small variation in performance indicates the varying mixture of these two widely different coals. Facilities are being added for handling pea coal, and these will bring the over-all capacity of the plant up to about 100 tons per hour.

In Indiana, the Big Vein Coal Co., at Buckskin, and the Princeton Mining Co., at Princeton, both of which load coal mechanically, have adopted Menzies Hydro-Separators. The Buckskin installation, a complete washing plant, designed for a capacity of 125 tons per hour, embodies tandem units for primary washing and rewashing of 3x0-in. coal. A Menzies installed in the Upper Potomac field of Maryland is recovering Georges Creek Thick Vein coal, abandoned with refuse on the slate dump in earlier days of mining.

Screening of small coal, phrased as "quite a problem" up until a few years ago, grows more rarely troublesome. Knowledge of screen limitations is becoming more common. Improvements are constantly being made in the actuating mechanisms and in the screens themselves. Design which minimizes blinding while increasing capacity per unit of area, and materials which minimize wear are improvement characteristics. Basing operation on screening performance too close, or beyond, the limits of screen efficiency in sizing and tonnage handling has contributed largely to dissatisfaction. A deeper insight into the effects of moisture in the coal on ultimate results is aiding screening practice.

At first confined chiefly to small coal, the size range of vibrating screens has been steadily widened to include 4-in. coal. Frequencies and length of stroke are in inverse, but not regular, proportion to the size to be treated. That at least five new vibrating type screens were introduced in 1930 is an indication of this activity, to which tipple as well as mechanical separation plant installations contributed.

The practice of mixing sizes in various combinations for steam purposes to meet an exact condition in the consumer's plant in 1930 went far ahead of activity in any previous year. Control of size percentages, which flexible mixing facilities give, has done much to keep old customers satisfied and to win new markets by minimizing adjustments of combustion conditions. A feature in recent design of mixing systems is electric, air, or hand-lever control of changeover elements, which allows switching from one size combination to another with little delay in plant operation.

Both tipples and mechanical cleaning plants face the problem of size mixing, but the latter, in addition, frequently must provide uniform mixtures of raw coal, either in size or composition, or both. Often storage bins are involved and these tend to introduce problems in degradation and size segregation, which is even more undesirable. If bins are to be utilized, how large should they be to insure a continuous flow of raw feed to the plant, and how should the bins and accessory equipment be arranged to minimize segregation and degradation, are real problems to plant operators.

One captive plant is provided with a huge, multiple-compartment bunker. Breakage in this case is no consideration. But up until now no commercial cleaning plant has adopted a plan so elaborate. Granting that breakage can be held to a low degree, the question is whether commercial plants will follow this lead or hold storage facilities down to a run of 15 to 30 minutes or, at most, 1 to 2 hours.

A suggestion has been made that the simplest way out, perhaps, is storage in mine cars. A surplus of cars would be provided and cars would be dumped on parallel tracks, to give flexibility of feed and to take care of variations in characteristics of coal

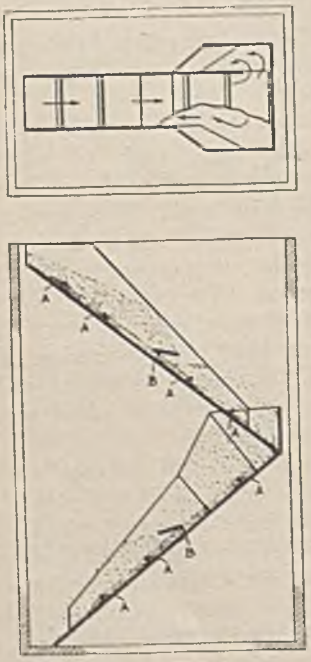


Fig. 2—Avalanche Bin Chute

from several mines or the several sections of one mine. This scheme would avoid the breakage and segregation which is incidental to bunkering.

Degradation in the filling of storage bins is being minimized by use of loading booms equipped with hoist for raising and lowering. This arrangement is in the design of a large feed bin in the new Mayflower tipple of the Blue Diamond Coal Co., at Bonny Blue, Va. A more elaborate plan than this is found at the mine of the Edgefield Coal Co., near Canton, Ohio, where two booms are so mounted on a traveling crane that they can be spotted in the horizontal as well as the vertical plane. They fill an eight-compartment bin of 800 tons' capacity (see *Coal Age*, p. 11, January, 1931).

Adams patented avalanche (filling) chutes and withdrawal chutes, offered by the Robins Conveying Belt Co., are designed to meet the problem of degradation and segregation in bunkering. The avalanche chute (Fig. 2) consists of one or more sections or passes, depending on the repose angle of the material and the width and depth of the slope. In the chute sections are alternately positioned transverse retarding angles *A* and inclined avalanche plate *B*. A bed of fines is retained by each angle and serves both as a cushion and as a protection against abrasion. Each plate holds back a mass of material until a sufficient weight and volume is built up to carry the mass over the plate. The effect is a series of avalanches which are said never to overflow the chutes until arrested at the level of bin fill. Here the material spreads out and completely buries the chute.

The withdrawal chute, shown in section in Fig. 3, is simply a vertical rectangular chute with a slot in one side wide enough to let material flow in from the top surface of the mass in the bin. Withdrawal motion is confined within the chute; the flow originates in the top layer which is not under pressure when it moves to the chute; and the material in the chute, being of comparatively small volume, is loosely packed and flows smoothly against the vertical sides of the chute. Withdrawal from the top is intended to give a mixture of fines and lumps which is more uniform than is given by withdrawal from a simple bin-bottom gate.

Tests conducted by the U. S. Bureau of Mines in co-operation with the University of Washington, and also with the University of Alabama, showed that shape of particles was a determining factor in the efficiency of a pneumatic table, and that shape was not of so great importance in separation on a wet table.

Dry cleaning, especially of the smaller sizes, requires a uniformly low surface moisture in the coal for best results. A proposal was made of the possibility of applying to this problem the use of heat dryers similar to the units installed at washeries.

Advances in general preparation-plant design are now far beyond bare necessities. More thought is being given to accessibility of machines and accessories to minimize break-down delays and aid inspection. Steel is taking the place of iron in castings under hard service. Extra heavy wearing plates are recommended and more durable metals are applied throughout. Equipment is being chosen and arranged to minimize vibration.

Foreign criticisms that coal-handling structures in the United States

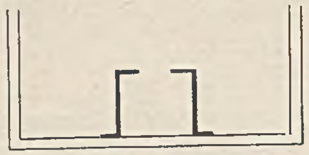


Fig. 3—Withdrawal Bin Chute

do not compare favorably with the massive designs across the sea from the standpoint of proof against vibration is made less justifiable than ever by current design on this side. American mine-plant construction, following this nation's general engineering economics and practices, seeks a safe balance between maximum strength and minimum material.

Plant control in the main has not achieved a satisfactory degree of perfection. Obviously, the simplest and most direct first step in control is to take samples systematically and to base adjustments of equipment on the results. But the most cannot be gotten from this procedure unless it is backed by carefully compiled logs and training of the human senses. These are the avenues along which control in the operation of some plants has been attacked. Various degrees of automaticity in control are the goal at a few.

Despite the striking progress of last year and the years immediately preceding, much remains to be done to accelerate expansion of preparation. There are to be evolved deferred-payment plans for the purchases of equipment either with the manufacturer or with commercial credit services. Tolerances of extraneous impurities in the finished bituminous products must be established with the consumer. Premiums in keeping with the degree of preparation must be demanded. More weight must be placed on marketing plans in the selection of equipment; facts and not personal preferences should hold sway. Finally and in justice to the industry, it knows what it wants but it has not fully determined how to get it.

SAFETY

+ In Coal Mines in 1930

By SCOTT TURNER

Director, U. S. Bureau of Mines

WHEN complete reports of accidents in coal mines in the United States in 1930 become available, they probably will show at least one hundred fewer fatalities than in the preceding year. A saving of about 87 lives, as compared to last year, will be credited to bituminous coal mines, and 13 or more to anthracite mines. This general statement is based upon incompletely revised figures for the first eleven months of the year, and an estimate for December, for which no records are as yet available.

Superficially considered, the picture thus presented might be thought a pleasing one. It would indeed be encouraging, if no further facts had to be brought to our attention. However, with the reduction in the number of lives lost there was a proportionately larger reduction in the year's output of coal. The result was that each ton of coal produced in 1930 represented a somewhat larger loss of life than in the previous year. Present indications are that this increase in loss of life per ton of coal produced amounted to about 9 per cent.

The death rate per million tons is estimated at 3.91, as compared with 3.59 in 1929. Most of this increase was due to the larger number of deaths from major explosions of gas or coal dust during the past year. Without such explosions in either year, the death rate would still have been a little higher in 1930, chiefly because of a slight increase in the rate for falls of roof and coal. It is not at all unlikely that conditions incident to the slowing down of production were a factor contributing to the increased accident rate for the year.

It is expected that the death rate, calculated on a tonnage basis, will show an increase of about 9 per cent for bituminous coal mines and about 4 per cent for anthracite mines.

Death rates based upon the number of men employed cannot be stated or even approximated at this time, because no information is available regarding the number of men working at the mines last year. Complete returns giving these figures will not be received from mining companies until late in 1931.

The following table shows the estimated number of fatal accidents at coal mines in 1930. Although it is unusual and sometimes proves embarrassing to disclose exact figures in the absence of complete reports, I am doing so in the present instance because the figures convey, more clearly than a general discussion can, an idea as to how 1930 probably will compare with 1929 as far as fatal accidents are concerned. The figures for 1930, as given below, have been adjusted, as far as practicable, to allow for accidents that occurred in December, for which no reports have been received, as well as for injuries last year that may terminate fatally some time in 1931.

Unfortunately, no complete records exist as to the number of men injured but not killed by accidents in the coal-mining industry. Reports covering a small number of mines in various states indicate that about 55 employees are injured in bituminous mines to every man that is killed. Similar reports for anthracite mines show approximately 72 injuries to each fatality. These rates are based exclusively on ordinary accidents; they do not take into consideration so-called major disasters, meaning those in which five or more lives are lost. Such disasters usually result in far more fatalities than injuries. Assuming that these ratios held good last year, we have reason to believe that 76,000 men were injured in bituminous mines and 33,000 in anthracite mines, a total of 109,000 non-fatal injuries disabling the employees for one day or more.

Because of the urgent need for definite information regarding so large a number of accidents, the Bureau of Mines has requested all operators to furnish the Bureau with a summary of all lost-time accidents at their mines in 1930. I hope that every company will supply this information and thereby aid in promoting safety in coal mining. The need for such data has long been felt by those interested in the prevention of accidents. With such information available, a clearer understanding should be obtained of the relative safety of various methods of operation and of the effectiveness of various safeguards, such as rock dust and permissible explosives.

Eleven major disasters, with a

Estimated Number of Fatalities at Coal Mines in 1930, Compared With Actual Number in 1929

	1929		1930		1930 Per Cent Death Rate	
	Number Killed	Rate per Million Tons	Number Killed	Rate per Million Tons	Increased	Decreased
Underground:						
Falls of roof and coal	1,182	1.94	1,101	2.07	6.7	....
Haulage	413	.68	329	.62	....	8.8
Gas or dust explosions:						
Local explosions	50	.08	67	.13	62.5	....
Major explosions	145	.23	211	.40	73.9	....
Explosives	88	.15	75	.14	....	6.7
Electricity	81	.13	78	.15	15.4	....
Miscellaneous	88	.15	102	.19	26.7	....
Total	2,047	3.36	1,963	3.70	10.1	....
Shaft	29	.05	15	.03	....	40.0
Surface	111	.18	96	.18	....	....
Grand total	2.187	3.59	2,074	3.91	8.9	....

loss of 223 lives, occurred during the first eleven months of 1930, as compared with five disasters resulting in 83 deaths for the same period in 1929. All of these disasters were gas or dust explosions, except one fall of roof that caused five deaths in 1929 and one fall of roof that caused eight deaths in 1930. As may be seen from the table accompanying this article, the major-explosion death rate, as estimated for 1930, was 0.40 per million tons, as compared with 0.23 for 1929.

Anyone who seriously considers the subject of safety in coal mines during the past ten years will doubtless be impressed by the general downward trend in the number of men killed in relation to the output of coal, the yearly increase in the average daily output per worker, and the almost stationary level of the annual death rates in relation to the number of men employed.

THIS situation is gratifying, but is by no means as encouraging as it should be. Although mechanized mining and other improved operating methods introduce new hazards into the mines, in the long run they doubtless will enable the country to obtain its annual coal supply with fewer and fewer deaths per ton. It is reasonable to expect that more modern methods will have this effect. Undercutting machines are accounting for a steadily mounting percentage of the country's yearly production of coal. Obviously, these machines make possible the production of any required tonnage with fewer employees than were necessary when hand labor was in vogue. This situation has been accentuated during the past few years by the installation in many mines of mechanical loaders and conveyors.

Quickening of production at the face has speeded up haulage and other operations throughout the mines. This speeding-up process has increased the productivity per worker. In some mines, however, it has not reduced accidents in proportion to the reduction in the number of employees following the installation of the machines. With usual tonnage levels maintained by machines, the number of accidents may have been reduced, but the machines have effected a more marked reduction in personnel. The same number of accidents, or even a slightly smaller number, when spread over a much smaller working force, does not reduce the accident rate per man employed; it may, in fact, raise rather than lower the rate. Where such a situation obtains, the miner's job is as hazardous if not more so than it was before.

Let us not forget that accident-prevention work has two fundamental objectives: First, to mine a half billion tons or more of coal each year with each ton representing a minimum loss of life or limb; second, to improve conditions so that, of every thousand men employed in the mines, an annually increasing number may complete a year's work without being killed or injured. This two-fold objective presents an increasingly difficult task. A relatively simple matter it is to reduce the death rate per ton of coal mined. To the credit of the mining industry it

Scott Turner

may fairly be said that this has already been accomplished to a great extent, through the abandonment of hand work for machine work. The outlook is bright for continuance of this progress. But every step of this progress, every machine installed, leaves in the mines a smaller number of employees against which to figure the accidents that occur.

Unless accidents are reduced in at least equal proportion to the employees displaced by machines, the accident rate per man employed will rise. We want to make mining safer, not only in the social or economic sense but also for the men who work in the mines. In brief, safety work ought to reduce the blood-cost of coal, and at the same time improve the miner's acceptability as an individual applicant for life insurance. Unless the latter object is accomplished, the hazards to which the miner is exposed have not been lessened, however much the blood-cost of coal may be reduced through more efficient methods of working. More effective supervision is made possible by machine methods of operation, and this fact should more than offset the new hazards the machines introduce.

One definite achievement during 1930, so far as the Bureau of Mines is concerned, and one that should contribute toward the prevention of accidents, was completion of the training of 112,000 employees in the mining and related industries in first-aid or mine-rescue methods. Of this number, 72,000 men were employed in coal mines. The total number trained last year was about 31,000 more than in any previous year, and it brought the total number of persons so trained by the Bureau of Mines since its establishment to approximately 480,000.

As the labor turnover in mining is heavy, it is not possible to say what proportion of the million men now employed in the mineral industries has been trained in that way. The number trained in 1930 and the years immediately preceding that year would indicate that a substantial part of the personnel has been trained and that this proportion is likely to increase rapidly in the future. Included in last year's work was the training of 100 per cent of the employees at 118 mines or plants. Those who have left the mining industry are carrying the benefits of their first-aid training into their new vocations.

Although the past year was marked by a large number of deaths in explosions of gas or dust, it is gratifying to state that an increasing number of companies are rock-dusting their mines to prevent or limit explosions of this type. The Bureau's investigations and experiments have demonstrated that the heavy loss of life formerly resulting from explosions can be prevented by the proper use of rock dust. Inadequate dusting is likely to give a mining company and its employees a false sense of security, but if rock dust were applied properly to all parts of the mine, and were so applied in all mines, the coal industry probably would free itself from the expense and suffering that these explosions formerly entailed.

INCREASING use of permissible explosives instead of the more dangerous black blasting power is a credit to the coal-mining industry. Ten years ago, permissible explosives constituted 14.6 per cent of the total quantity of all explosives used in bituminous mines and 16.8 per cent in anthracite mines. During the first ten months of 1930 the proportions had increased to 31.1 per cent and 32.3 per cent, respectively. It is probable that these figures will not be changed materially when reports for November and December are received.

Records of the bituminous coal mines that have won first place in the National Safety Competition conducted by the Bureau of Mines during the past five years are as follows:

Year	Man-Hours	No. of Lost Time Accidents	No. of Days of Disability	No. of Accidents per Million Man Hours	Days of Disability per Thousand Man Hours
1925	756,585	13	242	17.2	0.320
1926	815,715	7	165	8.6	0.202
1927	688,937	1	91	1.5	0.132
1928	418,869	3	22	7.2	0.053
1929	264,656	3	21	11.3	0.079

The figures in the last two columns of this table are most significant. They establish a goal that all companies may strive to reach. Possibly better records have been made by other companies, but the figures as given represent the best safety achievements of which the Bureau of Mines has heard. These figures cover all accidents where an employee lost as little as one day; and, when injuries are permanent, the accident severity rates include the standard charges for days of disability as recommended by the International Association of Industrial Accident Boards and Commissions.

The significance of the safety records of these winning companies is revealed by comparison of the above rates with the average rates for all bituminous mines that participated in the annual contests. In 1925, for example, the winning company had an accident severity rate of 0.320, while the average rate for all companies was 10.486, which shows that the winning company's record was 30 times better than the average for the group. In the next year's contest, the winning rate was 0.202, as compared with 10.707 for the group, the former being 50-fold better than the group average. Again, in 1927, the group rate was 15.739, while the company that won the contest had a rate of 0.132, which was about 120 times less than the group average. In 1928, when the average rate for the group was 12.471, the winning mine had a rate of 0.053, which was more than 235 times better than the average. In 1929, the last year for which figures are available at present, the winning company's rate was 0.079, as compared with 11.571 for the whole group, again showing that the winner of the contest established a safety record 146 times better than the record for the group as a whole.

These safety records are the best that the annual contests have revealed. Other companies that participated in the contests made records that were almost as good. Would is not be helpful if all companies, wherever operating, would compare their own individual safety records with these outstanding ones and thus learn how far from the best their own accomplishments are? Possibly such a comparison would bring to light better records than those mentioned above. If this should prove to be the case, the Bureau of Mines would like to be informed. Marked success in accident prevention by any company is an encouragement to all other companies engaged in mining. Such cases, if made known to the whole industry, constitute a very real contribution to the promotion of safety.

Accidents at coal mines each year injure about as many people as the total population of any one of the following cities: Fall River, Mass.; Camden, N. J.; Erie, Pa.; Canton, Ohio; Fort Wayne, Ind.; Wichita, Kan.; Miami, Fla.; Knoxville, Tenn.; El Paso, Texas; or Spokane, Wash.

The prevention of these accidents, which range in number from 110,000 to 120,000 each year, is the most important problem that confronts the coal-mining industry. It is a job which will not be accomplished speedily. The waving of a wand will not do the trick. Nor will platitudinous pleasantries or safety slogans accomplish much. The job is a serious one and calls for serious thought and constant attention. Any material degree of success in the prevention of so large a number of accidents will depend upon the harmonious endeavors of many individuals. It will be achieved only through the efforts of three-quarters of a million employees and the presidents and other officials of the several thousand coal companies that control seven thousand mines, with such aid and information as can be furnished by other agencies.

The U. S. Bureau of Mines is glad to participate in this great work. Its investigations, experiments, and studies are conducted solely as an aid in the promotion of safety and efficiency in the mineral industry.

So earnestly are we bent on doing all we can to assist that we have recently made such changes in our organization as are necessary to accent and feature the work of statistical analysis on which must be based intelligent study of the safety problem. A new division, of which W. W. Adams has been made the head, has been created in our Health and Safety Branch. He will be assisted by his old organization, already skilled in the treatment of accident statistics. Dr. R. R. Sayers, widely known for his activities in safety and health promotion, continues as head of the branch. Additional funds will be allocated to this work as rapidly as they are appropriated by the Congress, and we solicit of industry a continuance of that cordial co-operation on which Mr. Adams and his associates are so dependent if they are to make real headway.

LARGE portions of the industry are already having marked success in preventing accidents. Many companies have reduced their accident rates almost to the vanishing point. Judging from past records, it would not be surprising to learn at any time that a large coal mine had been operated throughout a year without a lost-time accident. Several companies operating metal mines already have realized such success. Mines producing non-metallic minerals other than coal have done as well as those producing metallic ores. Stone quarries and open-cut mines have been even more successful. Among 141 properties of this type that participated in the Bureau's safety contest of 1929, 46, or about one-third, were operated without a lost-time accident during the year.

While underground mining is naturally more hazardous than surface mining or quarrying, there are several large coal mines that have failed by only a slender margin to win the distinction of operating a whole year without an accident causing loss of time. Complete success is likely to crown the efforts of any of these companies.

Large tonnage—many employees—a full year's operation—no employee injured; can such a goal be reached? Let us hope that at least one coal-mining company will give an affirmative answer during this new year.

RESEARCH IN COAL

+ Makes Fresh Progress in 1930

MORE research is in progress on the processing and utilization of coal and coal products than the average man in the mining industry might suspect. A *Coal Age* editorial survey of this activity during 1930, in which technical institutions in every coal-producing state were canvassed, shows that many phases of the coal industry's problem of extending demand for its products are being investigated. This survey does not embrace private researches being made by those industrials engaged in coal processing.

The attention given to processing problems compared with that directed toward problems of production, measured roughly by the number of problems in each category, is in the ratio of five to one in favor of processing. In the accompanying table are listed 81 problems representing the work of 20 institutions. Only 17 of these problems deal with production.

With some exceptions, the reports reveal evidence of individualized effort with little regard for co-operation between the research bodies. It certainly shows the real necessity for some agency to knit elements together. Perhaps that should be the enlarged function of the U. S. Bureau of Mines, which is already doing commendable work co-operatively with a few outside bodies and would do more if its appropriation were larger.

So wide and varied are the undertakings and services of the several divisions of the U. S. Bureau of Mines, an exact measurement of its accomplishment, even if restricted to the field of pure research in coal, cannot be adequately rendered. Serving at once as guardian of safety, consultant and public servant, the Bureau nevertheless sponsors and makes opportunities for fundamental and applied research. It stands willing to work co-operatively with institutions and industries within the limits of its appropriations.

In the field of coal it has been studying utilization in phases of newer developments, such as the combustion of powdered fuel, low-temperature carbonization, gasification, etc. Its extensive program of investigation has yielded results which, published, helped coal operators, marketers, and consumers.

With a special committee of the American Society of Mechanical Engineers as co-operator, the Bureau studied fundamental factors connected with the wet method of operating pulverized fuel furnaces, which keeps slag in molten form for drawing off. The studies showed that the method was not amenable to the use of coals having ash that fuses at high temperatures. Further tests have been made to find fluxes to overcome this limitation and extend the application of this method to all coals.

A problem of coke manufacturers is to produce grades and sizes best suited to domestic furnaces. This problem is important, as the quantity of coke used for domestic purposes has increased 2½ times in the past four years. An investigation of coke combustion problems involving domestic furnaces was made by the Bureau. A parallel study on anthracite is in progress.

Fundamentals applicable to the design of powdered-fuel furnaces have been enriched by a method which the Bureau used to investigate combustion of small particles. It determines accurately the amount of reaction and surface temperature of particles for regulated degrees of combustion. The particles are accurately shaped and weighed before being subjected to this test.

Effort is being bent to develop an inexpensive test procedure for determining gas- and coke-making properties of American coals. A procedure involving the carbonization of 80- to 90-lb. charges has been evolved by the Bureau. It has been standardized over both the low- and high-temperature ranges of three coals whose coke- and gas-making properties are known. Results for these coals show close agreement generally with those obtained in industrial practice. Other investigations on coal, but not all, conducted by the Bureau are included in the table.

Four problems are being studied at Lehigh University with the support of the Anthracite Institute. One is to determine whether the constitution of anthracite is constant in each seam and different from seam to seam. Objects are: (1) correlation of beds and (2) finding relation of constitution to physical and chemical behavior. Four hundred etched sections from the Pennsylvania fields have been observed under the microscope, and results promise that constitution can be used as a basis for correlation. The further significance of constitution will be shown later as more work is done on combustion and chemical uses.

In the department of bacteriology a study is being made of the comparative efficiencies of sand and fine anthracite in water purification from both bacteriological and chemical standpoints. Incidentally, an examination of anthracite for presence of living bacteria revealed that none exists.

The specific heat capacity of anthracite in comparison to other solid fuels is being studied in the physics department. Apparatus is being designed for ignition temperature tests and ground work is being laid for a more thorough study of adsorptive properties, with particular attention toward increasing this activity. Other properties will be investigated in co-operation with the U. S. Bureau of Mines.

Experiments have shown that ordinary methods are not effective in radiographic examination of anthracite. In the chemistry department an entirely new technique has been developed by experiment and consultation with manufacturers of special X-ray equipment. Results already accomplished indicate the probability that X-ray studies will determine: (1) nature of the carbon, whether crystalline, etc.; (2) size of particles, distribution and kind of mineral matter; (3) whether carbon or hydrocarbon; (4) relation of different constituents to morphological constitution.

An investigation is being made of the benzenoid constitution of coal as shown by its oxidation with alkaline permanganate. This work parallels a similar study by Prof. W. A. Bone, in London, on English and Canadian bituminous coals. Objectives are the determination of: (1) best conditions for oxidizing coal substance to obtain maximum yield of crystalline acids; (2) identification of acids produced by oxidation; (3) effect of maturity on oxidation products; (4) oxidation of anthracite, and a comparison of products, both quantitatively and qualitatively.

The Northwest experiment station of the U. S. Bureau of Mines and the University of Washington have co-operated in developing an elaborate research program. Two of the problems investigated last year involved pneumatic cleaning to ascer-

Coal Researches in Progress or Completed During 1930

Air Pollution (also see "Smoke Abatement")	
Removal of Sulphur From Coal and Stack Gases	University of Illinois
Air Pollution in the Pittsburgh Area	Mellon Institute of Industrial Research
Briquetting	
Briquetting of Fine Coal	University of Kentucky
Carbonization and Byproducts (also see "Chemistry and Physics")	
Agglutinating Power of Coal	U. S. Bureau of Mines
Byproduct Coking	Mellon Institute of Industrial Research
Carbonization Characteristics of West Virginia Coals	West Virginia University
Carbonization Yields	University of Alabama
Carbonization of Cannel	University of Kentucky
Coal Distillation	University of Pittsburgh
Coking by Parr Process	State University of Iowa
Effect of Inert Substances on Coking Properties of Coal	U. S. Bureau of Mines
Effect of Fusain and Related Inerts on Coking Properties	Carnegie Institute of Technology with U. S. Bureau of Mines
Gasification and Byproduct Recovery by White Process	Battelle Memorial Institute Ohio State University
High Vacuum Distillation	Coal Research Lab., Carnegie Institute of Technology
Influence of Heating Rate and Final Temperature on Properties of Derivatives; Energy Relation Involved (as a separate problem)	Coal Research Lab., Carnegie Institute of Technology
Lignite Coking Qualities	University of North Dakota
Loss in Agglutinating Power of Coal Due to Exposure	University of Washington
Low-Temperature Carbonization with Fischer-Type Retorts	University of Washington
Low-Temperature Distillation of Pennsylvania Coals	Mineral Industries Exp. Sta., Pennsylvania State College
Plastic State of Coal During Coking	U. S. Bureau of Mines
Procedure for Testing Coke- and Gas-Making Properties	U. S. Bureau of Mines
Standardization of Agglutinating Tests	Carnegie Institute of Technology with U. S. Bureau of Mines
Marshall-Bird Test on Agglutinating Power of Coal	University of Washington
Ceramics and Coal	
Properties of Clays Under Coal for Ceramic Purposes	Department of Geology of Indiana
Survey of Clays and Culms in the Anthracite Region	Mineral Industries Exp. Sta., Pennsylvania State College with Anthracite Institute
Thermal Efficiency of Coal-Fired Ceramic Kilns	University of Washington
Use of Fuels in Brick Kilns	U. S. Bureau of Mines with University of Ohio
Chemistry and Physics of Coal Analysis (also see "Constitution and Properties")	
Action of Nitric Acid on Coal in Anhydrous Media	West Virginia University
Chemistry of Decay in Relation to Peat and Coal; Separation of Ether-Benzol Solubles in Peat	Carnegie Institute of Technology with U. S. Bureau of Mines
Chlorine on Coal to Determine Nature of Coal Substance	Coal Research Lab., Carnegie Institute of Technology
Composition Low-Temperature Tar; Isolation of Certain Alcohols	Carnegie Institute of Technology with U. S. Bureau of Mines
Kinetics of Oxidation	West Virginia University
Significance of True Density Measurements of Coal and Coke	Coal Research Lab. Carnegie Institute of Technology
Solvent Extraction Studies of Bituminous Coals	West Virginia University
Combustion of Coal and Coal Products (also see "Ceramics")	
Burning Coke and Anthracite Domestically	U. S. Bureau of Mines
Choice of Coals and Application to Specific Boiler Plants	Ohio State University with State Dept. Finance
Combustion of Illinois Coals	University of Illinois
Combustion of Pulverized and Lump Coal	West Virginia University
Combustibility and Reactivity of Coke in the Blast Furnace	Mineral Industries Exp. Sta., Pennsylvania State College
Comparative Heating Value of Gas, Oil, Coal, and Coke in House Heating	Purdue University
Lignite Combustion Equipment; Stokers, for Domestic Use	University of N. Dakota
Measuring Combustion Rate of Pulverized Coal Particles	U. S. Bureau of Mines
Mechanism of Combustion Using Solid Fuels	Coal Research Lab., Carnegie Institute of Technology
Mechanism of Burning Individual Pulverized Particles	Carnegie Institute of Technology with U. S. Bureau of Mines
Molten Ash Operation of Powdered Fuel Furnaces	U. S. Bureau of Mines with A.S.M.E.
Pulverized Coal Combustion	Battelle Memorial Inst.
Stokers for Small Boilers in Household and Semi-Industrials	Purdue University
Testing Coals in Boiler Operation	Ohio State University with Mine Operators
Constitution and Properties of Coal (also see "Chemistry and Physics")	
Analysis and Friability of Washington Coals	University of Washington
Chemical and Thermal Values of Iowa Coals	State University of Iowa
Constitution of Anthracite	Lehigh University with Anthracite Institute
Friability of Illinois Coals	University of Illinois
Physical Characteristics of West Virginia Coals	West Virginia University
Physical Components of Coal—Vitrain, Fusain, etc.	Department of Geology of Indiana
Properties of Anthracite	Lehigh University with Anthracite Institute
Sulphur Studies	University of Alabama with U. S. Bureau of Mines
Weathering Properties of Iowa Coals	State University of Iowa
X-Ray Studies of Anthracite	Lehigh University with Anthracite Institute
Distribution of Coal	
Economic Survey of Mining Industry in Pennsylvania	Mineral Industries Exp. Sta., Pennsylvania State College
Retailing Problems and Practices in Columbus Area	Ohio State University
Mining Methods	
Accident Studies, Hand Vs. Mechanical Loading	University of Illinois
Coal Mine Ventilation	University of Illinois
Coal Mine Haulage	West Virginia University
Coal Mining Methods and Costs	U. S. Bureau of Mines
Effect of Electric and Magnetic Field on Flame Propagation	Carnegie Institute of Technology with U. S. Bureau of Mines
Falls of Roof and Coal (a continuation study)	U. S. Bureau of Mines
Ground Movements and Subsidence	U. S. Bureau of Mines
Occurrence of Bumps	U. S. Bureau of Mines
Rock-Dusting	U. S. Bureau of Mines
Roof Action and Subsidence	Columbia University
Preparation of Coal	
Flotation of Washery Sludge	University of Washington
Flotation of Coal	Mineral Industries Exp. Sta., Pennsylvania State College
Drying of Lignite	University of N. Dakota
Pneumatic Cleaning Tests	University of Washington
Washability Tests, Iowa Coals	State University of Iowa
Washability of Illinois Coal	University of Illinois
Washability Studies and Tabling Tests	University of Alabama with U. S. Bureau of Mines
Smoke Abatement (also see "Air Pollution")	
Smoke Abatement Studies	Stevens Institute of Technology
Utilization	
Use of Anthracite as Agent in Water Purification	Lehigh University with Anthracite Institute
Utilization of Tars	University of Alabama

tain the mechanism of separation and flotation. Coal from the Roslyn field was studied to determine its amenability to dry-cleaning methods. Measurement of agglutinating power of coal was continued in a study of the loss of coking properties in high-oxygen coals after weathering.

An extensive coal-sampling program was carried out during 1929-1930 and friability properties were studied in connection therewith. In addition to direct data, much information dealing with coal resources, mining, beneficiation, and economics of distribution was gathered.

Work done on thermal efficiency of coal-fired ceramic kilns resulted in appreciable saving in fuel and burning time without lowering the quality of the ware. Low-temperature carbonization tests conducted on Washington coals, in small Fischer type laboratory retorts yielded data on coke, gas tar, and oil. The program for the current year includes the study of a unit pulverized coal-firing system. One of the phases proposed for investigation is the relationship between costs of oil and coal firing.

At the West Virginia University, investigations covered practical problems of production as well as research in utilization. A study was made of the mechanism of the kinetics in homogeneous oxidation of hydrocarbons, with reference to the burning of volatile matter of coal in the gas phase. Fundamental findings of this work will be applicable to all hydrocarbons. A study of the mechanism of coal involving pulverized and lump coal also was under way.

To obtain deeper insight into the structure and constitution of bituminous coal is the purpose of a study dealing with the action of nitric acid on coal in anhydrous media. The possibilities of a new commercial process for the utilization of coal are being developed by investigation into the extraction of bituminous coals under various solvents with varying conditions of temperature and pressure. Preliminary work is under way to determine carbonization characteristics of bituminous coals. Various temperatures will be employed with each type of coal and the byproducts and char tested. Another study has to do with the physical and structural properties of West Virginia coals.

A graduate school has been established at West Virginia University. One of its divisions will deal with industrial science and research. It expects to devote much of its attention to various aspects in the production and utilization of bituminous coal.

The Indiana State Department of Geology has been studying the physical components of various coal beds to determine the percentage of fusain, vitrain, etc. It also has been giving attention to underclays associated with coal beds to determine their use in ceramics.

During the last year and a half, the University of Kentucky has been applying low-temperature carbonization methods to cannel coal. These studies are being projected to embrace bituminous coals. Hydrogenation tests will be made. Experiments on the briquetting of bituminous coal fines using various binders are in process.

In co-operation with the Utilities Research Commission the engineering

experiment station of the University of Illinois has been investigating the removal of sulphur, particularly organic sulphur, from coal before it is fired, and of sulphur dioxide and trioxide from stack gases. Factors affecting preparation and washability, and the performance characteristics in combustion of Illinois coals were the objects of attention in two studies made co-operatively with the Zeigler Coal & Coke Co. Investigations were conducted to discover methods of determining friability by measuring degradation in both size and weight in a standard drop test. A study also was made of the friability of freshly mined coal from the principal producing districts of Illinois.

Through its studies on smoke abatement the Stevens Institute of Technology, Hoboken, N. J., has been instrumental in the organization of a department of smoke regulation for Hudson County, headed by a mechanical and deputy engineer. Ordinances have been published and are being considered for enactment. Rules and regulations governing construction details for fuel-burning equipment are being prepared.

A new principle has been developed at Columbia University, New York City, for studying in the laboratory the action of roof above coal mines. It involves an apparatus for revolving an exact model of a mine structure, or miniature roof beams, so that controlled centrifugal force provides the pressure for flexing, breaking, and fracturing the models. Clay, concrete, and rocks are the materials used.

Under a co-operative agreement with the Southern experiment station of the U. S. Bureau of Mines, the University of Alabama is conducting washability studies of various Alabama coals. Tabling test and sulphur tests also are being made and field assistance is offered the operators. A group of operators is financing low-temperature carbonization experiments at the university. Determinations have been of the yield of semi-coke, tar, and gas from all coals of the state. Work now in progress is directed toward more effective utilization of the tar.

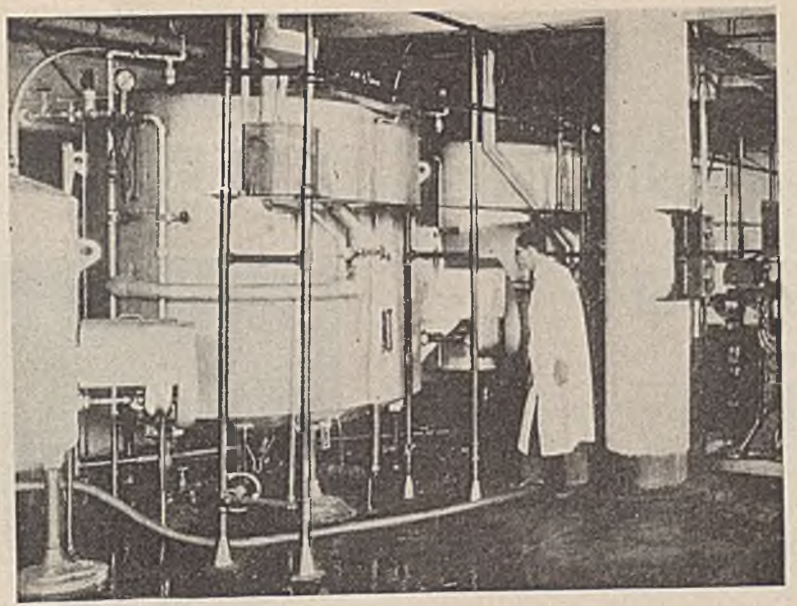
The Carnegie Institute of Technology, Pittsburgh, Pa., in co-operation with the mining advisory board of operators and the U. S. Bureau of Mines, supports six coal fellowships each year. These are listed in the accompanying table.

Founded July 1, 1930, the coal research laboratory at Carnegie began its program of pure research on coal. Ten new laboratories and a machine shop have been installed and equipped, and six members of the staff selected. Statements of three problems begun follow:

1. High-vacuum distillation of coal in an endeavor to obtain primary decomposition products. It is planned to carry out this work at pressures of 10^{-4} to 10^{-6} mm. Most previous vacuum distillation has been made at a pressure of 3 mm. or greater.

2. Influence of rate of heating and final temperatures reached on the properties of products from coal. This will include physical and chemical studies of solid residue as well as of volatile constituents.

3. Energy relationships involved in heating coal under the same conditions as for the preceding problem. Heat of distillation will be measured and an attempt made to correlate energy requirements with the nature of the products obtained. Information obtained should permit conclusions to



be reached regarding the actual mechanism of thermal decomposition in coal substance. Two additional studies are listed in the table.

To increase the thermal value of lignite by the removal of moisture without destroying the original properties of hardness and resistance to shock is the problem about which research is centered at the University of North Dakota. The economic aim, naturally, is to further the production and marketing of lignite, which abounds in the state. Two major lines of attack are being followed: namely, drying by gases, with controlled humidity, and drying by treatment with saturated steam at high pressures (Fleissner process). The latter has dried lignite from an original moisture of 35-40 per cent to 12-15 per cent final moisture without disintegration. A study of the nature of the water is involved.

Coking of lignite is being extended, a process having been worked out whereby the major portion of the oxygen is removed as carbon dioxide by carbonization at temperatures not over 450 deg. C. Mixed with proper proportions of bituminous coals and subjected to high coking heat, the char is said to influence the production of an excellent coke and a gas containing not over 3 per cent of carbon dioxide. Studies are being continued on domestic heating and cooking equipment, particularly for burning lignite. Domestic stoker performances also are being studied.

Of the studies being made in the engineering experiment station at the Ohio State University, perhaps the most important is the testing of Ohio coals in boiler-plant operation. This work was undertaken at the request of the State Department of Industrial Relations and a committee of mine operators representing about 90 per cent of the potential tonnage of the state. Present plans propose a long-time continuation of these studies, until all the important Ohio coals have been tested.

In co-operation with the bureau of business research, the engineering experiment station at Ohio State University investigated the operating practices and problems of retail coal dealers of Columbus. The project embraced a study of organization types, sales volume, transporting and handling equipment, and competitive practices, including private trade names. Data also were obtained on dealers' knowledge of coal and on extent of service rendered to customers. Two other problems studied at this university are included in the table.

At the State University of Iowa, investigation involved individual studies of chemical and thermal values, storage characteristics, weathering properties, washability, and coking tests of Iowa coals. Most important of the carbonization tests were those conducted by the Parr process.

One of the investigations in progress at the Mellon Institute of Industrial Research, Pittsburgh, Pa., during 1930, dealt with large-scale byproduct coking tests and took into consideration the purity, physical properties, and practical importance of banded constituents in coal. Inquiry into air pollution was continued, collection of precipitated solids for the Pittsburgh area being completed. Chemical analyses were made for comparison with results of collections in 1912-13 and 1923-24.

Co-operating with the Ohio State University, Battelle Memorial Institute, Columbus, Ohio, has been carrying on experiments in the White carbonization process, in which coarsely powdered coals are carbonized during a fall through an externally heated vertical retort. Tests were made on coals from Ohio, West Virginia, and Illinois. It was found that only the weakly caking coals could be used without sticking to the retort wall and clogging the free space. Complete equipment has been installed at this institute for an investigation of pulverized-fuel combustion.

Coking phenomena, particularly under low-temperature conditions, and utilization of lower grades of Pennsylvania coals were the center of an investigation at the Mineral Industries Experiment Station of the Pennsylvania State College. The retort used has a capacity of 25 lb. of coal and is electrically heated and controlled. This study also included reaction rates of cokes under test conditions simulating blast-furnace operation. Two studies also were made to determine the relative activity of these cokes, and of standard high-temperature cokes, with carbon dioxide and with oxygen, under temperature conditions similar to those obtaining in a blast furnace. Here the object was the possible formulation of quick laboratory tests to indicate the probable value of a given coke for blast-furnace use.

A research is being conducted at this station on the flotation of coal, both with and without frothing agents of the usual type, special attention being given to the selective agents. Its object is information on the basic nature of flotation.

To develop information leading to the manufacture of ceramic products, utilizing culm and shales originating from anthracite mining is the assignment of a fellowship in the ceramics department. The study is supported by the Anthracite Institute. A study of the chemical and physical properties of about 60 samples of deposits taken from the various anthracite regions has been largely the work of the first year. Preliminary tests indicate that these materials are capable of being converted into brick and hollow tile. It may be necessary, owing to the peculiar properties of these materials, to develop methods differing radically from accepted ceramic processes. An economic survey of the mining industries of Pennsylvania also is under way.

MODERNIZATION REFLECTED

+ In New Installations of Mining Equipment

VIEWED solely from the standpoint of radical changes in electrical and mechanical equipment used in coal mining, the year just closed was one of relative quiet. From the standpoint of new installations denoting progress it was a year of real activity. Definite trends, as indicated by preferences, experimentation, and new equipment offered, became visible in several of the features that are undergoing changes. Considering the low level of general business activity, the year is outstanding for the number of conveyors, tipples, and mechanical cleaning plants completed or under construction. In these there is notable evidence of the use of improved types of electrical and mechanical equipment.

Power requirements per ton of coal shipped show an increase, due principally to the additional loads imposed by the new cleaning plants. Economies effected in the underground utilization of electric power by reason of more efficient distribution have been balanced by the extending use of electricity for drilling and loading and by the inevitable increase in haulage distances and average shaft depths.

Bituminous mines of the country average between 5 and 6 kw.-hr. per ton. South of the Ohio, where relatively few mines have deep shafts and where few must pump excessive quantities of water, 4.4 kw.-hr. per ton is considered a fair average. Mechanical cleaning of bituminous coal is adding approximately 1.5 kw.-hr. per ton to the power requirements.

Conditions as to percentage of electrification, water pumping, and preparation in the anthracite field vary so widely that average figures are of little use. For a completely electrified mine 20 kw.-hr. or more per ton may not be excessive.

Few coal-company generating plants were built during the year but several companies began studies of the economic possibilities of generating power from unmarketable or low-grade coal to displace purchased power. At Price Hill, in the New River field of West Virginia, the Price Hill Colliery Co. built a four-unit 1,200-kva. total capacity Diesel-engine generating plant to displace purchased power. (*Coal Age,* p. 655, November, 1930).

Referring to substation practice, the motor-generator is still the favorite, taking the country as a whole, but it is significant that several companies which have had long experience with both types installed converters in the new substations built last year. Higher standards of a.c. distribution, resulting in better voltage regulation, and the increasing use of synchronous motors for fan and pump drives have extended the possibilities for converters. The higher efficiency, transformers included, is the principal advantage of the converter.

Full-automatic control equipments were simplified and made still more reliable. Several manufacturers adopted the copper-oxide rectifier as the means of insuring correct polarity on converter controls. Portable and full-automatic substation units mounted on three mine trucks were put to their first extensive operating test during the year.

No additional installations of mercury-arc rectifiers by coal-mine companies were reported, but this type of substation equipment made decided progress in other industries. Obtaining a supply of clean water for cooling the rectifier and prevention of freezing are difficulties that may be encountered in a mining installation. In the anthracite field, two-circuit lines were provided to certain main substations, and a trend toward renting utility-owned and maintained substations was evident. Installation of a number of automatic power-factor control equipments on synchronous motor-generators indicate a trend toward making "full-automatic" substations live up to their name. Power factor is controlled instead of allowed to vary with load, the peak load capacity is increased, and machine heating reduced.

The trend toward synchronous motors for steady loads gained impetus. More mine fans were so equipped, a new pumping station in the William Penn colliery, Shenandoah, Pa. (*Coal Age,* p. 713, December, 1930), contains two 500-hp. units, and a number of synchronous motors were installed on blowers of Peale-Davis cleaning plants.

Practices relating to other stationary motors changed but little during the year. The range including 75 to 100 hp. continues to be the popular dividing line between the selection of 2,200-volt motors of the larger sizes and the 220- and 440-volt motors in smaller sizes. The 440-volt winding appears to be losing ground in favor of 220 and 2,200. Several manufacturers now offer fan-cooled induction motors having inclosed windings and anti-friction bearings. This type of motor bearing continued its rise toward rather general adoption for stationary mine motors.

In the operation of rotary dumps, instead of the ordinary induction motor equipped with two magnetic brakes, one for slow down and another for dead stop, or a d.c. motor using armature shunt control for slow down, the year 1930 brought the successful application of a two-speed induction motor in which the low-speed winding is connected during the last few degrees of dump rotation, thus slowing to a fixed low value for the final stopping by the magetic brake.

For tipple and cleaning-plant wiring there was a marked increase in the use of BX flexible armored cables in place of rigid conduit, especially in the smaller plants. For power wiring the BX cable usually results in a job which lacks the neat appearance of a rigid conduit job, but builders report that it costs 25 to 35 per cent less. Certain preparation-plant installations made during 1930 brought a revolt against the rather general practice of grouping all magnetic controllers in one location. Instead they were mounted near the respective motors so that the overload protection elements of the controllers would be subject to the same room temperatures as the motors. An advantage of the former method is that the group can be housed in a dustproof room.

The standard of inside feeder circuits was raised appreciably during the year. A large quantity of 6/0 trolley wire was installed, and for a.c. feeders to portable motors on loading machines, conveyors, and so on, three-conductor cables replaced much of the open-type single-conductor wiring. Wildwood mine adopted the placing of 2,300-volt armored feeder cables in trenches in the mine floor.

A trolley circuit code proposed by the U. S. Bureau of Mines contained two regulations of special interest:

> Electric haulage by locomotives operated from a trolley wire is not permissible in any gassy portions of mines, except upon the intake air fresh from the outside; and
>
> In new installations the wire shall be shielded unless it is at least 7 ft. above the rail.

During the year 36 approvals for permissible mining equipment were issued by the Bureau. This exceeds the activity of any previous year. For complete listing, see the accompanying table.

Late in the year an announcement was made that the Bureau had decided to recommend rubber-sheathed cable passing certain tests as safest for use with permissible mining machines, although formal approval will not be extended to cable in its present stage of development. "Hazacord" No. 2 parallel duplex was the first to pass a special test of endurance, being run over 50 times on both rails, with the cable shifted each time, at 3½ m.p.h. by a 7-ton 4-wheeled car, and with potential applied without becoming short-circuited or grounded at more than 10 per cent of the places.

IN AN attempt to minimize the trailing-cable hazard on gathering locomotives having explosion-tested electrical equipment one company tried using two single-conductor cables and two reels on each locomotive. The idea is that each conductor can be provided with heavier insulation and there is much less chance of a short-circuit between conductors in case of runover. Some trouble has been encountered with the first units, because both reels are driven from one motor. Irregular spooling of the cables sometimes results in excessive slack in one of them. This mechanical difficulty can be remedied by using a separate motor for each reel or possibly by a geared differential.

Battery locomotives gained a pace by Mancha's announcement of the telescopic low type for use in thin seams. This allows the advantage of quick change to a charged battery, which heretofore has been possible only on locomotives operated in thick seams.

Locomotives which are the largest and best equipped in the industry rounded out their first year of service during 1930. Each unit consists of two 20-ton locomotives in tandem. Anti-friction bearings are used throughout, and the 150-hp. motors are blower cooled. The rated speed is 10.5 m.p.h. (*Coal Age*, p. 587, October, 1930). Main haulage motor crew labor cost was halved and locomotive maintenance cost quartered by displacing the old locomotives with these 40-ton units.

A trend toward taking advantage of forced ventilation for increasing capacity or reducing maintenance of existing electrical equipment became evident. In *Coal Age* (p. 149, March, 1930), Carl Lee describes the application of blowers to the 675-hp. motor and 550-kw. motor generator of a Peabody hoisting installation.

At several mines, main haulage locomotives were equipped with blowers to reduce armature winding maintenance. At a Kentucky mine, the purpose was to allow a duty cycle which would not heat the motors to the point where grease could not be kept in the ball bearings of the armatures.

Automatic track signals and selective electric switch throwers registered belated progress during the year. One company installed complete systems in several of its mines, using standard equipment built for electric railroad duty. The expenditure was authorized from the standpoint of safety, but so satisfactory was the operation that it was found advisable to dispense with brakemen on main-haulage locomotives, and this saving alone justified the expenditure.

MINE lighting, admittedly unsatisfactory, showed little progress, except as registered by improvements in electric cap lamps and the application of strong headlights as standard equipment to track-mounted mining machines. Face lighting for conveyor loading, the greatest need, progressed to the point that the officials of at least one company learned by experiment that illuminating low workings from large floodlights was unsatisfactory because of glare in the eyes of the loaders. Announcement of "Stringalite" cable by the Sullivan Machinery Co. (*Coal Age*, p. 755, December, 1930) appears as an important development toward the ultimate solution of face lighting.

On the main belt conveyor at Wildwood mine a new method of securing drive-pulley speed differential was put into use (*Coal Age*, p. 282, May, 1930). Necessary difference in peripheral speeds of the two drive pulleys which should vary according to stretch produced by belt load was secured by connecting a motor to each pulley. The characteristic of one motor causes it to drop in speed slightly more than the other as load is applied.

Electrical developments of the year not pertaining specifically to coal mining but which may find application therein are: the multiple-winding synchronous motor suitable for line starting where high starting torque is not required, announced by the General Electric Co.; the Rossman adjustable-speed induction motor which has a rotating primary driven by a smaller direct-current motor supplied from an auxiliary motor generator, of the Allis-Chalmers Mfg. Co.; detachable plug-type watthour meters of Westinghouse; and a fuse said to have a super time lag by virtue of strips of zinc spot-welded to the heavy part of the link.

In the realm of mechanics perhaps the greatest change was registered in drive connections between stationary motors and the driven equipment. V-belts, now offered by at least three manufacturers, enjoyed a tremendous increase in popularity. Twenty to thirty of these drives are evident in several of the medium-sized bituminous cleaning plants built during the year, and it is likely that none of the plants is without a few drives of this type.

Gear reducers also had a good year. Practically every new plant contains a few. As an example, one new plant consisting of conveyor and tipple without mechanical cleaning equipment uses eight gear reducers. This type of drive has almost completely displaced the open-gear train reduction. Users are coming to realize that a high-grade gear reducer of latest design will have as long a life and is fully as reliable as any piece of equipment with which it is associated. Service is proving that with proper lubrication there is practically no wear.

A 300-ton per hour combination wet and dry cleaning plant built by the Link-Belt Co. for the United Pocahontas Coal Co. uses only silent chains for motor drive connections.

Automatic pressure lubrication of groups of bearings from central points assumed proportions where it might be called a common practice for new preparation plants. Manifold greasing of locomotives and other inside equipment continued to forge ahead.

The year registered considerable activity in experimentation with wear-resisting materials in preparation plants, especially in the anthracite field. Chrome-iron and other alloys are being tried on circulating equipment for the Chance sand flotation process. Stainless steel is having a chance to prove its value for segments on shakers.

Rubber has undergone a considerable test in the form of pipe for handling sand and water with the Chance system, as a cone lining for the same system, and as a lining for chutes.

The year witnessed several trials of mine cars of welded construction, and it is reported that there was some activity in trying alloy steels for mine car wheels. Two car designs of special interest came to light during the year. Both have bodies which are independent of the trucks.

On one the body is solid and the material is dumped by passing the car across a section of track equipped with guides to tip the body sidewise. The body is hinged to the truck and the latter rides along the track in normal position as the dumping takes place (*Coal Age*, p. 309, May, 1930). So far as known no mine has been equipped with this type of dump and car. The other car, suited for the ordinary types of dumps, gains extra capacity by virtue of a truck unit having heavy flat bars across the bottom in place of axles (*Coal Age*, p. 704, November, 1930).

Mine-locomotive wheel and tire practices registered few changes from the rather general practice of using steel tires on cast-iron wheel centers, and turning worn tires after annealing. The use of rolled-steel wheels appears to have extended during the year. Many companies continued to turn tires without annealing, a practice which plenty of experienced maintenance men brand as uneconomical. Apparently the principal reason for such radically different views lies in the difference in grades and voltage conditions in the mines. Tires operating in mines having severe grades or where locomotives are habitually overloaded and the voltage is low may contain so many hard spots that annealing before turning appears to be absolutely necessary.

Mining equipment maintenance costs continued to drop during the year. Gradual replacement of old equipment, educational activities of efficiency associations and institutes, and further official recognition of the importance of maintenance, all had their effect. In the last three years one large producer of bituminous coal cut the labor and material cost of maintenance of all mechanical and electrical equipment from around 20c. to 10c. per ton.

Aluminum paint registered a further gain in popularity. It is considered to have high protective qualities and appeals to the coal operator because of its distinctive appearance in contrast to the long-time association of "black" with coal.

The larger companies made progress in scientific approach for determining service capacity of materials. Studies are being made to find materials which will give the greatest life per dollar invested. In the general realm of research, coal company executives evidenced an unmistakable interest during the year. The feeling is growing that a real scientist could play an important part in the coal-mining industry.

Bureau of Mines Permissible Approvals for 1930

Company	Type of Machine	Hp.	Volts	Type of Current
	Loading Machines			
Goodman Manufacturing Co.	148-E power shovel	22	220	D. C.
Bertrand P. Tracy Co.	Pit car loader	1	250–500	D. C.
The Jeffrey Mfg. Co.	44-C loading machine	7½	250–500	D. C.
Goodman Manufacturing Co.	636-AK3 entry loader	35	220–440	A. C.
The Jeffrey Mfg. Co.	38-D pit car loader	3	220–440	A. C.
Gellatly & Co.	G and M at type face conveyor	2	230	D. C.
Gellatly & Co.	Type A conveyor	5	230	D. C.
Fairmont Mining Machinery Co.	Face conveyor	3	230	D. C.
Gellatly & Co.	Type A conveyor	5	230	D. C.
	Mining Machines			
Sullivan Machinery Co.	CLE-2 longwall mining machine	30	220–440	A. C.
The Jeffrey Mfg. Co.	24-B longwall mining machine	35	220–440	A. C.
Sullivan Machinery Co.	CLU cutting-shearing machine	50	220–440	A. C.
Sullivan Machinery Co.	CR-3 shortwall mining machine	30	220–440	A. C.
Sullivan Machinery Co.	CR-3 shortwall mining machine	30	250–500	D. C.
The Jeffrey Mfg. Co.	35-L shortwall mining machine	50	250–500	D. C.
Goodman Manufacturing Co.	12-EL-3 and 12-CL-3 shortwall mining machines	50	220–440	A. C.
Goodman Manufacturing Co.	12-EK-3 and 12-CK-3 shortwall mining machines	35	220–440	A. C.
The Jeffrey Mfg. Co	35-L low vein cutting machine	50	220–440	A. C.
Sullivan Machinery Co.	CS-4 swivel-shearer cutting machine	30	250–500	D. C.
Goodman Manufacturing Co.	312-E. J. shortwall mining machine	50	210–500	D. C.
Goodman Manufacturing Co.	124-C.J. and 324-C.J. slabbing machine	50	210–500	D. C.
	Mine Pumps			
The Brown-Fayro Co.	Austin-Brownie 5x6 "Perfect Oiler" mine pump	5	250–500	D. C.
Westinghouse Elec. & Mfg. Co.	Boyts-Porter and Co. type No. 6501 mine pump	5	230	D. C.
Fairmont Mining Machinery Co.	50 Gallon mine pump	5	230–500	D. C.
Fairmont Mining Machinery Co.	100 Gallon mine pump	5	230–500	D. C.
Fairmont Mining Machinery Co	100 Gallon mine pump	10	230–500	D. C.
	Rock-Dusting Machines			
American Mine Door Co.	Type H rock-dusting machine	20	500	D. C.
Diamond Machine Co.	Rock-dusting machine	12	95	D. C.
Diamond Machine Co.	Rock-dusting machine	15	230	D. C.
Mine Safety Appliances Co.	Type 65 rock-dusting machine	5	220	D. C.
	Storage Battery Locomotives			
The Jeffrey Mfg. Co.	DM-15 storage battery locomotive	...	....	.....
General Electric Co.	Type LSB-2C5-F-324 locomotive	...	....	.....
Westinghouse Elec. & Mfg. Co.	"Midget" locomotive	...	....	.....
	Miscellaneous			
Sullivan Machinery Co.	WK-22 air compressor	20	230	D. C.
Siemens-Schuckert Co.	AE-430 coal drill	[illegible]	250	D. C.
Flood City Brass and Electric Co.	Room hoist	5	230	D. C.

DRASTIC LIQUIDATION

+ Of Excess Mine Capacity Brightens Prospects for Future

By F. G. TRYON, R. W. METCALF and H. O. ROGERS

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SINCE 1920, a total of 1.665 operators have been forced out of the bituminous coal industry. In that year, which marked the culmination of the war boom, there were 6,277 corporations, partnerships, or individuals engaged in mining soft coal on a commercial scale. In 1929, the number had fallen to 4,612. The elimination of these unlucky producers bears mute testimony to the ruthlessness of the competitive struggle in recent years, but in one sense it represents progress. It is a sign of the drastic liquidation of excess productive facilities which the industry has already accomplished. With excess capacity thus reduced, prospects are more favorable for the stronger companies that have managed to survive.

The mortality has chiefly affected the small—though not the smallest—groups of companies. As Fig. 1 shows, all sizes of companies grew in number from 1895 (the year of the first record) up to 1920. The drop since 1920 has been sharpest in the class producing from 10,000 to 50,000 tons a year. In this size class the decrease amounts to 51 per cent. Very high mortality also has marked the groups producing from 50,000 to 100,000 and from 100,000 to 200,000 tons a year.

Above 200,000 tons, on the other hand, the mortality has been small, and in the groups over 500,000 tons there has been an actual increase. In 1929 there were 218 companies producing more than half a million tons, or 29 more than at the peak of the boom (Table I).

A surprising feature of Fig. 1 is the apparent vitality of the smallest producers, the class of less than 10,000 tons a year. On their face, the figures indicate almost as many operators in this class today as at the time of the boom. In part, this showing is more apparent than real. Changes in the Bureau's methods of collecting data have made its lists of these small operators more complete than they were in 1920, and the figures are not wholly comparable. Furthermore, a good many companies that used to be in the next larger class have since dropped down into the smallest class. But there is reason to believe, also, that the mortality in this group of smallest operators has been somewhat less than in the middle-sized groups, or perhaps that the birth rate has been higher.

The group consists largely of what may be called "local commercial" operators. It does not include country coal banks and wagon mines producing less than 1,000 tons, nor the mushroom crop of fly-by-nights that sprung up during the 1920 boom and has since disappeared.[1] Many of the

[1]In 1920 the Bureau obtained through the railroads reports from 4,405 "wagon mines shipping by rail" (see "Coal in 1922," p. 536). These have been excluded from the present comparisons, which are limited to mines operating on a commercial scale.

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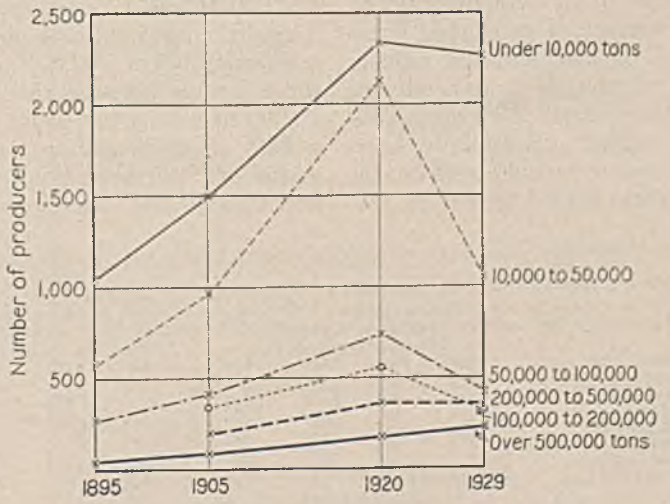


Fig. 1—Number of Companies Producing Bituminous Coal, Classified by Size of Output, 1895 to 1929
(Wagon mines producing less than 1,000 tons are not included)

operators in this class have been on the Bureau's lists for years, producing their small tonnages season after season. They generally serve a local market, often by wagon or truck, and are sheltered from the active competition of the larger producers. Some of them are co-operative ventures and others enjoy an advantage in lower wage rates. Protected in this way, a surprising number of the local commercial operators have survived the competitive storm. In any case, their story is not of great importance, for even in times of active market they produce less than 2 per cent of the national supply.

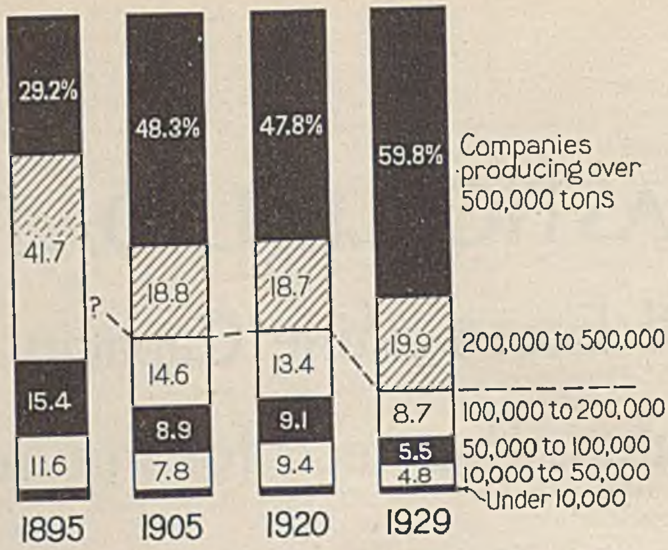


Fig. 2—Increase in Percentage of Total Bituminous Output Contributed by the Larger Companies

In 1895, the companies producing over 500,000 tons a year accounted for 29.2 per cent of the output; by 1929 their share had risen to 59.8 per cent. Companies producing from 200,000 to 500,000 have been holding their own. The shrinkage has come in the smaller companies of less than 200,000 tons. Note that for 1895 the figures do not permit subdividing the companies between 100,000 and 500,000 tons.

FIGURES used in this review are based on the annual reports courteously furnished by coal operators to the Bureau of Mines. The operator supplies a statement for each mine separately, and the tables as published regularly show the number and size of *mines* (see "Bituminous Coal Tables, 1929," Sheet 15).

In order to show the number and size of companies, as distinct from mines, the reports for 1929 have been retabulated and are here compared with similar special studies for 1895, 1905, and 1920 ("Coal in 1922," pp. 535-543). Each corporation (or partnership or individual operator) has been counted as one producer or "company," and no account has been taken of interlocking ownerships or interests. Numerous instances of financially affiliated corporations will occur to anyone familiar with the industry. The Bureau has not sought to inquire into such relationships, however, and in default of accurate information it has seemed best to report each corporation as a separate business unit. Were it possible to allow for such cases of common ownerships, the total number of producing interests would be less, and the number in the larger groups—those producing over 500,000 tons, for example—would be greater. Essentially, however, the picture would remain the same—a very large number of producing interests struggling for the available business.

The wholesale elimination of the small and middle-sized producers has tended to concentrate the available tonnage in the hands of the larger companies. Fig. 2 shows that between 1895 and 1905, the tonnage contributed by companies of over 500,000 tons increased from 29.2 per cent of the total output to 48.3 per cent. In the next fifteen years there was curiously little change, but since 1920 the large companies have continued to gain at the expense of the smaller ones, and in 1929 they accounted for 59.8 per cent of the total output. The next lower size group (200,000 to 500,000 tons) has just about held its own, accounting for 19.9 per cent in 1929, as against 18.7 per cent in 1920. The shrinkage has come about in the companies below 200,000 tons. The three groups between that level and 10,000 tons have lost from a third to a half of their tonnage. Even the group of little operations producing less than 10,000 tons shows a loss.

The competitive advantage of the companies larger than 200,000 tons is unmistakably clear if we study certain tests of efficiency, such as the number of days worked per year and the average output per man per day. This is done in Table II.

The first step is to separate the captive companies, whose superior market connections give them an artificial advantage in working time. In 1929, there were 226 companies controlled by consumers and delivering half or more of their annual output to the consumer owner. Their operations are shown in the lower half of Table II. Companies controlled by consumers but selling more than half of their output on the commercial market have been classed as commercial.

Deducting the 226 captive organizations, there remain 4,386 commercial companies, shown in the upper half of the table. They operated a total of 5,570 mines and produced 76.9 per cent of the total output. They reported lower sales realizations than the more fortunate captive mines, worked fewer days, and as a group had a lower output per man per day.

IN FIG. 3 the operations of commercial companies are plotted in a way to bring out the relation between size of company—shown on the horizontal scale—and efficiency—shown on the vertical scale. It is clear that output per man per day, which is one indicator of cost, increases rapidly with size of company up to about

Table I—Trend of Size of Bituminous Operating Companies, 1895-1929

(Data exclude wagon mines producing less than 1,000 tons a year. Each operating corporation is treated as one operator, regardless of possible affiliations with other corporations)

Companies producing:	Number of Operators 1895	1905	1920	1929	Per Cent of Total Production 1895	1905	1920	1929
Less than 10,000 tons	1,055	1,492	2,349	2,277 (a)	2.1	1.6	1.6	1.3
10,000 to 50,000 tons	590	961	2,121	1,043	11.6	7.8	9.4	4.8
50,000 to 100,000 tons	285	403	727	408	15.4	8.9	9.1	5.5
100,000 to 200,000 tons	268	331	543	331	41.7	14.6	13.4	8.7
200,000 to 500,000 tons		199	348	335		18.8	18.7	19.9
500,000 to 1,000,000 tons		49	109	131		10.8	13.3	17.0
1,000,000 to 3,000,000 tons	32	39	64	70	29.2	19.8	19.5	22.9
3,000,000 and over		10	16	17		17.7	15.0	19.9
Total	2,230	3,484	6,277	4,612	100.0	100.0	100.0	100.0

(a) Figures for 1929 not entirely comparable with those for 1920; see text.

Table II—Summary of Bituminous Coal Mining Operations in the United States in 1929 Classified by Size of Producing Company

Size of Company	Number of Companies	Number of Mines	Actual Production: Net Tons	Actual Production: Per Cent	Average Sales Realization	Average Tons per Man per Day	Average Days Worked	Potential Production if Mines Worked 280 Days	Excess of Potential Over Actual Production
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Commercial									
Companies producing:									
Under 10,000 tons..........	2,241	2,298	6,730,206	1.3	$2.22	2.74	127	14,953,000	8,223,000
10,000 to 50,000 tons.......	990	1,104	24,808,138	4.6	1.92	3.42	163	43,360,000	18,552,000
50,000 to 100,000 tons......	389	471	27,873,603	5.2	1.84	3.91	194	40,809,000	12,935,000
100,000 to 200,000 tons.....	302	426	42,399,342	7.9	1.73	4.54	216	55,564,000	13,165,000
200,000 to 500,000 tons.....	304	528	95,215,469	17.8	1.71	5.02	229	117,604,000	22,388,000
500,000 to 1,000,000 tons....	104	291	71,747,400	13.4	1.66	5.32	230	88,877,000	17,130,000
1,000,000 tons and over.....	56	452	142,741,110	26.7	1.67	5.16	235	173,262,000	30,521,000
Total commercial.........	4,386	5,570	411,515,268	76.9	1.72	4.77	214	534,429,000	122,914,000
Captive									
Under 10,000 tons..........	36	39	184,278	.....	2.02	3.03	192	263,000	79,000
10,000 to 50,000 tons.......	53	62	1,242,602	0.2	2.03	3.74	185	1,969,000	726,000
50,000 to 100,000 tons......	19	29	1,414,067	0.3	2.08	3.53	187	2,157,000	743,000
100,000 to 200,000 tons.....	29	47	4,138,055	0.8	2.09	3.85	216	5,554,000	1,416,000
200,000 to 500,000 tons.....	31	63	11,218,750	2.1	2.15	4.30	250	12,610,000	1,391,000
500,000 to 1,000,000 tons....	27	62	19,053,324	3.6	1.95	5.45	232	23,744,000	4,691,000
1,000,000 to 3,000,000 tons..	24	110	41,312,883	7.7	1.91	5.14	234	49,315,000	8,002,000
3,000,000 and over.........	7	75	44,909,366	8.4	2.02	5.58	259	48,784,000	3,875,000
Total captive............	226	487	123,473,325	23.1	1.99	5.13	240	144,396,000	20,923,000
Grand total..............	4,612	6,057	534,988,593	100.0	$1.78	4.85	219	678,825,000	143,837,000

200,000 tons yearly output. From 200,000 tons to 500,000 it continues to increase, but much less rapidly, and beyond 500,000 tons it shows no marked change. Steadiness of operation, which is both cause and effect of variations in cost, shows a parallel relation; the number of days worked per year increases very rapidly up to 200,000 tons a year, then breaks, and beyond 500,000 tons flattens out.

The curve of sales realizations per ton is the reverse of the efficiency curve. Operators producing less than 10,000 tons sold their coal for an average of $2.22 a net ton. That some such price was necessary to enable them to exist is shown by their extremely low output per man-day (2.74 tons) and their short working time (127 days). The next larger group of companies got less—$1.92 a ton—and with each successive larger group the average sales realization falls until it reaches $1.66 for the group producing from 500,000 to 1,000,000 tons. From there on the curve flattens like the others.

THE position of the small companies is partly explained by the fact that companies with difficult mining conditions naturally tend to be small. To cite an extreme case, the dozen or so operators who work the Osage seam of Kansas—only 21 in. thick—cannot, by the nature of things, get out large tonnage. They, and many others in less difficult conditions but still handicapped in comparison with operators in thick seams, go to swell the smaller size brackets. It is clear that such operations can survive only where coal of exceptional quality or nearness to market enables them to command high prices. Thus a considerable fraction of the companies below 200,000 tons come from Iowa, Missouri, Kansas, Arkansas, and Oklahoma, where difficult mining conditions are partly offset by the freight differentials against the more easily won coals of Illinois, western Kentucky, and the Appalachians. Still others of these small operators are serving a local market only by wagon or truck.

With due allowance for this tendency, it is evident that the larger companies enjoy a competitive advantage. The relation between small and large holds true not only for the United States as a whole but for individual districts.

But the most striking fact disclosed by Fig. 3 is that above an annual production of about 500,000 tons further increase in size seems to bring no consistent gain in either output per man-day, working time, or price. The averages shown, of course, are made up of widely differing conditions. They include strip and deep mines, mechanized and hand loading, lignite and semi-bituminous coal, good roofs and bad, and North and South. Further studies of the same data by districts may show a greater advantage accruing to the larger companies. As the figures stand, however, they suggest that companies above 200,000 tons enjoy a great advantage over those below, but that above 500,000 tons, or at the most, a million, bigness alone is less of an advantage than might have been supposed.

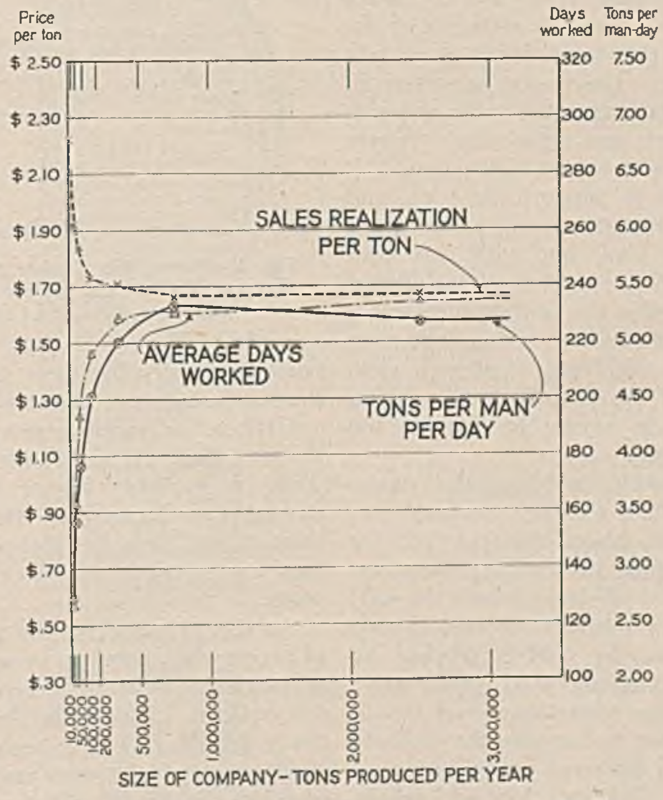


Fig. 3—Comparative Performance of Large and Small Bituminous Mining Companies in 1929

As size of company increases, average working time and output per man also increase, while average sales realization falls. This is true up to 200,000 or 500,000 tons a year. Above 500,000 tons, there is no consistent change. Captive companies are not included.

COAL INDUSTRY

+ As Europe Visualizes It

By R. DAWSON HALL
Engineering Editor, Coal Age

OTHER countries, other manners. Europe sees the mining problem with other eyes than ours. With us it is loading mechanization that attracts most attention, but progress in mining in Europe, especially in Great Britain, seems most marked in the matter of roof support. This subject has never had the intensive study in this country that has been accorded to it in Europe, perhaps because our difficulties are less pronounced, this in turn being the result of our use of the room-and-pillar system and the low cost of timber.

Longwall workings favor recovery of timber where the supports can readily be recovered, where the supports are such as to aid the work of recovery, and the strength of the supports prevents their premature destruction. Discussion has arisen in Great Britain as to the value of yielding supports and rigid ones. Where the mine is deep the rigid support is inadequate to support the roof, and yielding supports are necessary or the props will fail, but with cap, foot piece, roof, and floor all yielding a little and even the jack compressing a little, there may be in some instances, even with rigid props, enough yield to protect the prop from "breaking its back" in trying to support too heavy a load.

J. S. Carson, in his second report to the British Colliery Owners' Research Association, declares that the use of yielding supports has been discontinued in all faces where the coal is mined by machine, though in two faces where the coal is worked by hand the yielding steel props have shown some advantages. It would be interesting to compare the ultimate strength of different props, but variations in weight per foot and height render such a comparison difficult. The accompanying table has been prepared from "Steel Pit Props," a publication of the Safety in Mines Research Board, of Great Britain, strengths given being for supports as nearly 4 ft. 6 in. long as the tables in the publication would afford.

Many yielding props were not tested to destruction but only to the limit of yield provided by the construction of the post. But as yielding props are too complicated to be economically subjected to deforming and fracturing stresses, the limit of yield is the economic limit and not the ultimate crushing strength. Even, however, if all allowances and exceptions are made and ultimate strengths are taken for yielding props, it will be seen that the rigid-tube and the joist type had higher crushing strengths. Moreover, they were simpler and weighed less per ton of crushing strength than yielding supports.

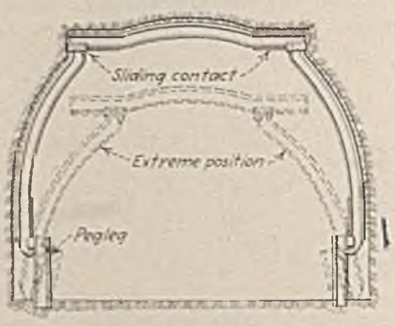


Fig. 1—Curved-Rib Timber Set With Peg-Leg Footing and Sliding Contact Between Post and Cap

As the pressure on the third row of props when about to be withdrawn seldom exceeds 30 tons, according to the bulletin, "Steel Pit Props," already quoted, it will be seen that the rigid props of all types are equal to meeting the loads and the yielding props just barely able or not able to meet them. However, one must take any statement as to pressures with some caution, for a prop with a dynamometer on the top of it will be a yielding support, and if the roof is held on three sides by rigid props the dynamometer may have less to carry than they. Even if several adjacent props carry dynamometers their yielding character will save them from much of the weight they would otherwise have to bear, because by yielding they will throw the weight on the coal and roof rock.

Moreover, the posts should be equal to all occasions rather than to those that are normal. It is interesting to note that the committee did not study tubular props with sand filling, which have the quality of great resistance to crushing. It does in fact not mention this early type of post.

In this connection it may be said that it was found by Prof. S. M. Dixon, of the Imperial College of Science and Technology, London, England, that in the Deep Soft seam at Lowmoor Colliery, Nottinghamshire, England, the load on the props seldom exceeded 20 tons. Three other dynamometer props set in the Six-Feet seam at Llanbradach Colliery, in Wales, where the depth of cover is about 4,380 ft. and the roof gives much trouble, showed that except under special circumstances—for example, when approaching a fault—the load on the props seldom exceeds 25 tons (The Colliery Managers' Pocket Book, 1931, p. 12).

In Germany, where, owing to the operation of bed over bed, to faulting, and to depth, the pressures are extreme, arrangements have been made to give flexibility to steel sets by arranging for resisted movement where the caps rest on their posts, by curving all members of the sets and by peg-legging the base of the posts so as to permit of vertical telescoping. Such a set and its capacity for shaping itself like an old shoe to the strains imposed on it is shown in Fig. 1.

Not only in the Ruhr but in other fields the hammer pneumatic pick is making headway, notably in the Saar field. M. Witier, chief mining engineer to the state administration in that field, describes these picks in the *Revue de l'Industrie Minérale.* The heavier ones weigh 23 lb. (less the pick) and have a piston weighing 1.54 lb. They deliver 1,800 blows a minute. The lighter picks weigh 20½ lb. without the pick, have a piston weighing 1.17 lb., and deliver 2,300 blows a minute. The pick is about 18 in. long, 1 in. in diameter, and weighs 2.42 lb. The 2,000 picks in use are producing 15,000 tons of coal daily, or 7½ tons per pick. It has been found that the men must be trained to use the picks expertly and that results will not be obtained unless the pick chosen is heavy enough for the job.

IN FACE conveying the tendency is toward the belt rather than the shaking conveyor, according to the *Eickhoff Mitteilungen.* "The belt conveyor is being adopted more and more for underground conveying." The article continues by explaining that the belt conveyor has a larger capacity, will handle moist, sticky, and fine stowing material more successfully, and operates more effectively in flat, level, or undulating seams.

That is the experience in England also, but it must be remembered that the shaking conveyor in its field is, as the aforementioned bulletin declares, well adapted to places where gravity aids the travel of the coal. Furthermore, the Eickhoff Brothers have recently introduced the use of two engines instead of one—the first to move the conveyor in one direction and the second to return it—and have found the capacity of the shaker chute greatly increased.

Loading machines of all kinds make little, if any, headway in Europe. M. Knepper, in *Glückauf,* last year declared that in the United States 33 per cent of the cost of coal represented the cost of loading. Probably with hand loading the figure is much higher than this. Herr Knepper declares that in the Ruhr the work of loading is only 4 per cent of the entire cost. In his opinion there was little incentive in the Ruhr to use loading machines except perhaps in the driving of rock headings. He thought the increased cost of timbering to accommodate loading machines would greatly reduce the profit.

In the domain of preparation, marked development has been made by the Birtley Iron Co., and details of this progress were contained in the article by K. C. Appleyard as delivered at the meeting of the Coal Division of the American Institute of Mining and Metallurgical Engineers, Sept. 11-13. From this it appears that Great Britain has been building a number of dry-cleaning plants and housing them in heavy buildings with brick-filled walls and reinforced concrete floors, not alone for strength and permanence but to avoid vitiating the work of the tables by the vibration of the building.

Moreover, care is taken to balance all parts such as pulleys, and it is arranged that shaking screens shall be aligned with the airtables, because, when they are placed at an angle, separation undoubtedly is adversely affected. Coiled springs and a torsion

Strength of Steel Mine Props

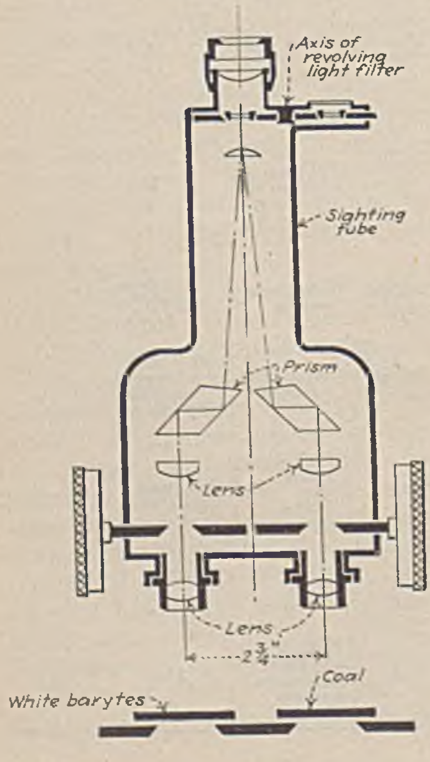
Name of Prop	Description	Length	Weight Pounds	Size External Inches	Ultimate Crushing Strength, Tons	Retested after cold straightening Ultimate Strength, Tons
Rigid Types of Prop						
Steel Tube	Steel tube prop with timber filling with plug at each end projecting 2½ in.	4 ft. 6 in.	51.60 / 63.20	4½	63.4 / 69.6	61.8
	Already used. One plug crushed down to 1 in. Other to ½ in. projection	4 ft. 6 in.	60.40	4½	75.5	77.8
	Already used. Both plugs crushed flush with end of tube	4 ft. 6 in.	56.20	4½	54.5	54.1
Chatham	Steel-tube prop; slot ½ in. wide along whole length	4 ft. 6 in.	35.12	3.98 / 0.22 thick	38.6	....
	Steel-tube prop; slot 18 x 1½ in. commencing 1 in. from end	4 ft. 6 in.	33.30	4.04 / 0.19 thick	36.6	....
	Plain unslotted	4 ft. 6 in.	36.55	3.98 / 0.21 thick	39.5	....
	Steel-joist prop, already used, hard treatment	4 ft. 9½ in.	56.00	5x3 in. / 11 lb. per ft.	40.0	43.3
Yielding Types of Prop						
Butterley	Tube closed at top with cast-iron plug, a sliding sleeve of steel with pair of slots inside sleeve. Plug set in top of sleeve	4 ft. 5 in.	47.25	3½	31.4	....
		4 ft. 6½ in.	45.00	3½	29.0	....
		4 ft. 5 in.	43.10	3½	30.5	28.6
		4 ft. 6 in.	46.00	3½	29.5	....
S. F.	Steel-joist stem with foot block and at upper end conical socket and wedge housing. End of joist cut at angle. Wedge slides between it and socket casting. Socket has tapered wood plug projecting 1½ in.	4 ft. 6 in.	54.60	3x3 (joist)	31.3	....
Tait	Rolled-steel joist with one end tapered which passes into a box made of a pair of cast-steel brackets held together by four bolts and containing two hardwood wedges. Top has pressed-steel cap	4 ft. 6 in.	77.30	3x3 (joist)	52.4	....
Berrisford	Short timber prop with longer steel portion. Timber portion 32 in. long fits into shoe of mild steel fitted with timber wedge backed with metal. Claws of shoe grip timber	....	....	3½ diam. (timber)	29.1	....
Sarre	Steel-tube prop with tapered wood plug. Two rolled steel joists held together by friction developed by action of pair of rollers and wood wedge held by floating link	5 ft. 1½ in.	54.50	2¾x2½ joist section	16.5 (max. load applied)	....
		4 ft. 7 in.			12.2	....
Newsarre	Same as Sarre with steel wedge replacing wood wedge and eccentric cam one of the rollers	4 ft.	76.00	3x3 in. joist section	25.9 (max. load applied, reaching yield limit)	....
S. A. M.	Broad flanged steel joist as lower member and two steel channels, joined at top by T-shaped cap, which slide back to back on either side of web of lower member. Two wedges acting through link bind all together	4 ft. 5½ in.	35.8	2¾x2¾-joist section. 1¾x¾ channel section	6.1 (max. load applied)	....
Mureaux	Uses friction of Ferrodo metal pad and a metal surface to resist movement	5 ft. 4 in.	55.0	....	17.7	....
Schwarz	Two rolled-steel channels held together by friction of an iron clamp and timber wedge	5 ft. 6 in.	56.0	3½x2½ in. and 2¾x1½ in. (channel sections)	23.6	....

balancing arrangement are placed under each separating table. Belt-conveyor feeds are used where circumstances permit, because in this way the jar which the links of bucket conveyors produce in passing over the tumblers is eliminated. All the installations now operating are of the V type. The coal is well aspirated before cleaning. In order to prevent segregation of the different sizes in bunkers which make the feed so irregular, care is taken not to drop the coal into the bunker in one direction and take it out in a direction at right angles.

A new dry coal cleaner is described by the *Revue de l'Industrie*—the Bruay system as perfected by M. Soulary. The coal is treated in four successive compartments of progressively decreasing width, each of which has its own box, into which the air is projected in a continuous stream. The vertical adjustment of the horizontal knife or scraper which handles the cleaned coal can also be varied to deal with any variations in the untreated coal. For this reason, the four tables can have different thicknesses of coal and not a single thickness.

The tables are oscillated as are tables of other types. The amplitude of the movement of each table is ½ in. The intermediate grades of coal, or middlings, are put back into circulation. Much attention is being given in Great Britain to blending, and some

Fig. 2—Photometric Method of Determining Ash Content of Coal



quite extraordinary facts are being discovered, such as that a coal of markedly non-coking quality may be mixed with a poorly coking coal to the advantage of the latter in the making of a coherent coke.

Dr. W. Gross and C. Abramsgy, in *Glückauf*, have recently described a method of determining the ash content of coal by comparing the relative quantity of light reflected from white barytes and impure coal, but, as the sample has apparently to be ground very fine, the method does not seem to admit of application to the picking table. The ground coal is laid on a plate and the white barytes plate is set at a distance of 2¾ in.

Light reflected from each of these plates passes separately through two lenses at the end of a sighting tube to which one eye of the operative is applied. Light from each source, still segregated, passes through two other lenses and thence to two prisms which bring the images into a single field of view. The observer sees two semi-circular areas together forming a disk and is able to compare these two halves, which vary according to the reflecting ability of the two materials being examined and according to the relative openings of two shutters placed between the lenses at the bottom of the sighting tube and the lenses within it, the size of the openings being regulated by a graduated wheel. It is said that the ash can be determined within ½ per cent in far less time than by the combustion test. This equipment might be well suited for control of cleaning operations.

THE same publication, *Glückauf*, described an investigation by the Vereine zur Uberwachung der Kraftwirtschaft (the Association for the Supervision of the Power Field), to discover what influence good lighting had on speed of picking coal and on the thoroughness of the process. The test was made above ground where the light could be controlled. Definite mixtures of 445 lb. of clean coal in sizes up to 2¾ in. were made with 55 lb. of shale, 33 lb. of which was 2-in. material and the other 22 lb. was of 3½-in. material.

Eight experienced boys were employed to make the experiment, and nine series of tests were made with light intensities ranging from 0.064 to 175 lux, a lux being one lumen per square meter. The boys showed quite varying aptitudes, the slowest boy being only half as speedy as the fastest, but when averages were taken it was found that the time required decreased rapidly as the illumination increased till 3 lux was reached and then the time of picking fell off only gradually. This test was, of course, too short to determine the effect which continued eyestrain and its drain on the well-being of the worker would have on his efficiency.

The painful necessities of mine ventilation engineers across the seas are likely to stimulate their ingenuities and make them willing to spend money on investigation and experiment. The Steart propeller fan is one of the new devices, already to be found installed not only in Natal, where it was first introduced, but also in Great Britain. The second instal-

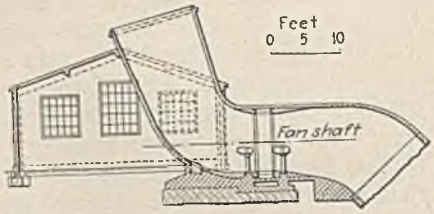


Fig. 3—Flaring Chimney Set at an Angle to Vertical Reduces Resistance to Fan Discharge

lation in the British Isles, that at Cefn Coed Colliery, of the Amalgamated Anthracite Collieries, Ltd., Crynant, Glamorganshire, South Wales, is briefly described in the January, 1931, issue of *Colliery Engineering*. It works on the same principle as the propeller of an ocean liner except that there are many more blades; in this instance six.

The advantages of the fan are described by Professor Briggs, head professor of mining, University of Edinburgh, Edinburgh, Scotland: (1) Simple and inexpensive housing; (2) ease of reversal, no reversing doors being necessary, but merely a reversal of the direction of rotation of the blades, (3) high rate of revolution favoring direct drive from electric motor; (4) ease of adaptation to changes in mine resistance and volumetric yield without loss of efficiency.

One interesting feature of this Cefn Coed installation is the *evasé*, or flaring, chimney of concrete which does not reach verticality but discharges at a considerable angle to the vertical. If the intake is near by, perhaps the exhaust should be thrown as far as possible, lest it be drawn back into the intake and so contaminate the mine air with methane and carbon dioxide. But if there is no such risk, a short and slanting exhaust duct should reduce the burden on the fan and serve all purposes.

COAL INDUSTRY

+ Tightening Battle Lines In War With Substitute Fuels

FOR business in general, taking stock at the end of 1930 consisted largely in dolefully entering up the losses in red ink. While coal is in largely the same position, it has, comparatively speaking, suffered less as the result of the year-long depression than almost any other commercial activity. Bituminous production declined 73,359,000 net tons, or 13.7 per cent, from the 1929 total of 534,989,000 tons; anthracite dropped to 69,802,000 tons, a decrease of 5.5 per cent. On the other hand, general business activity, as measured by *The Business Week* Index, fell from 107 in 1929 to 90 in 1930, a recession of 15.9 per cent.

The greater part of the falling off in soft-coal output was due to the general industrial depression. Distribution records indicate only nominal decreases in shipments to the Lakes, New England, and to foreign countries. Stocks also showed only a slight recession in 1930. On the other hand, material decreases in the consumption of coal by railroads and public utilities, two of the largest users of industrial coal, were registered in 1930. Domestic consumption varies little with industrial conditions, however, and, while definite figures are not available, the total burned as raw fuel probably will lie between 70,000,000 and 80,000,000 tons per year. If this total is subtracted from the bituminous production in 1929 and 1930, the recession in the latter year will approximate 16 per cent, corresponding to the decline in business activity.

Spot price movements in anthracite indicate a slight increase in the average realization per ton of coal shipped. The average bituminous spot price as determined by *Coal Age*, fell from $1.79 to $1.75, or 2.3 per cent. While prices, already at rock bottom, have little chance to recede, the showing made in the face of a 10.5 per cent decrease in the average price of 550 commodities used in compiling the U. S. Bureau of Labor Statistics index is distinctly favorable.

Neither inter- or intra-district competition in bituminous coal abated in 1930, although an increasing number of coal men turned to fair-trade-practice codes as a means of eliminating many of the abuses inherent in direct and indirect price cutting. Codes were adopted by the Operators' Association of the Williamson Field (West Virginia and Kentucky), Colorado and New Mexico Coal Operators' Association, and the Southwestern Interstate Coal Operators' Association (Kansas and Missouri.) In addition to the formal adoption of the above codes, the Ohio Coal Exchange also was formed to promote fair practices among producers in that state.

Renewed discussion of legal restrictions, following President Hoover's recommendation to Congress, in his message of Dec. 2, that an inquiry be made into the workings of the anti-trust laws in the natural-resource industries, disclosed that sentiment in the bituminous industry is by no means unanimous for modification of the Sherman Act and related statutes. A survey by *Coal Age* (January, 1931, p. 37) brought out that a number of important producers oppose such a change, on the theory that modification would mean further governmental regulation.

Encroachment of substitute fuels is a subject of increasing importance. Fuel oil continued to gain in 1930, though at a slightly reduced rate; natural gas enjoyed a boom year with no evidence of recession in the near future. Sales of domestic oil burners last year were estimated by the American Oil Burner Association, Inc., at 126,000, bringing the total number in use on Jan. 1, 1931, after replacements, up to 655,000. Total consumption of oil by domestic burners in 1930 was estimated at 29,790,000 bbl., against 23,147,000 bbl. in 1929. Average annual consumption per burner is as follows, according to the association: mechanical draft, 60 bbl.; natural draft, 40 bbl. As shown in Fig. 1, taken from a report of the association, mechanical-draft burners are the favored type.

Installations of commercial burners, each using an average of 500 bbl. per year, were estimated at 36,400 in 1929 and 39,200 in 1930. Estimated consumption of fuel oil by this equipment was 18,200,000 bbl. in 1929 and 19,600,000 bbl. in 1930. Converting the combined consumption of domestic and commercial oil in 1930, as estimated by the association, into coal, the equivalent of 11,000,000 tons was burned as oil in that year. Should the increase in the number of commercial and domestic burners recorded by the association in 1930 be maintained in the future, the coal industry would lose about 2,000,000 tons more each year to oil.

Eighteen states, a survey by the association shows, have 91.53 per cent of the domestic burners in use today. Illinois leads, with 131,000, or 24.5 per cent of the total. New York is

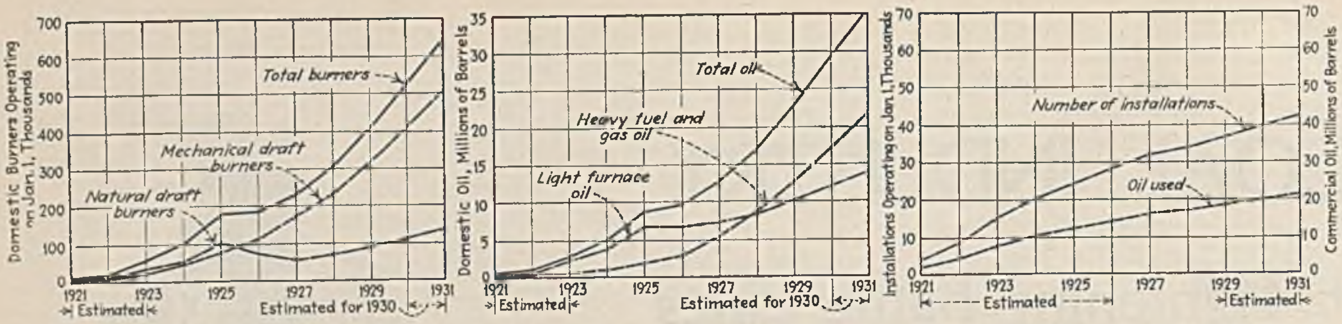


Fig. 1—Ten-Year Growth in the Use of Domestic and Commercial Oil Burners. Left, Growth in Number of Domestic Burners in Use; Center, Domestic Oil Consumption; Right, Commercial Burners in Use and Oil Consumption

second, with 103,000, or 19.2 per cent of the total. Pennsylvania and Massachusetts rank third and fourth, with 6.58 and 6.34 per cent, respectively. Louisiana, with 3.37 per cent, leads the Southern states.

According to the oil association, 504 retail coal merchants in 320 of the largest cities, located in 33 states, are now selling fuel oil. Canada reported eighteen combined oil and coal dealers in five cities. "Only three out of the eight cities canvassed in Canada and 77 out of 397 cities canvassed in the United States had no coal dealer who was not also selling oil."

On page 88 will be found a map of the United States showing most of the larger gas lines, built and projected, with the workable coal fields in the same area. To put in all the lines in the congested regions would serve no useful purpose. Some of the more important of the new lines may be mentioned:

OF THE 24-in. line from the Amarillo field in Texas to Chicago, 450 miles has been built. It will cost, it is said, about $100,000,000 when all the gathering and distributing lines and other facilities are considered. It will cross the Missouri at Plattsmouth, Neb., and the Mississippi at Muscatine, Iowa, and follow the right-of-way of the Rock Island R.R. to Chicago. Another important line, one of 20-in. diameter, finished during the year has been that of the Columbia Gas & Electric Co. It starts from a large main at Coatesville, Pa., crosses the top of the Conowingo Dam, and continues to Washington, D.C.

Rumors are afloat of a line to start at Covington, Va., and come northward to New York City, but confirmation of the project cannot be obtained. A gas line constructed for oil comes down from Olean and Binghamton, N. Y., to Paterson, N. J., with a branch at Tappan, N. Y., but it is such a small line that it would be useless to extend it to New York City.

Another scheme which is far more than a rumor is the construction of a 22-in. line to Detroit, Mich., from points in and around Breathitt County, Kentucky. Early in the present year the Southern Natural Gas Corporation completed the extension of its gas line into Atlanta and Macom, Ga. Gas reached Atlanta by this line Jan. 21. A number of other lines have been built to the Gulf ports such as Gulfport, Miss.; Macon, Ala., and Pensacoia, Fla. Other lines feed several thriving parishes in Louisiana. The New York Oil Co. proposes to build a line from the Central Wyoming gas field to Bridgeport, Neb., with a branch to Laramie, Wyo.

A line runs from a gas field in the southeast corner of New Mexico to El Paso, Texas. The intention is that a line shall be built 275 miles long through New Mexico and Arizona to Phoenix, in the latter state. It will have branches to the widely scattered copper camps and refineries. A trifling extension of one of the California lines of 22 in. diameter northward from Sacramento, Calif., to an inconsequential village, Chico, in the same state, has been the cause of rumors that a further extension to Seattle and Tacoma, Wash., was contemplated, but thus far it has been denied. A line has been constructed from Memphis to Jackson and Brownsville and thence to Covington, all in Tennessee. It is possible that the Appalachian Gas Co. will later extend this line from Jackson to Nashville and Knoxville.

One of the important lines very definitely planned is to connect the Amarillo and the Hugoton field of Kansas with Omaha, Des Moines, and Mason City and, possibly Chicago. The line from the Amarillo field to Indianapolis reports progress. Another line starting in the Hugoton field is to explore the commercial possibilities of the canning area in that state and to end, for a while at least, at Canon City, Colo. The Cedar Creek Anticline field in northeastern Montana is to be extended to Rapid City, in South Dakota. Gas from the field is to be used also in Fargo, N. D., if plans do not miscarry.

The coal industry's answer to the competition of oil and gas is typified by the Committee of Ten—Coal and Heating Industries, formed on June 17 to promote the use of solid fuel and representing anthracite and bituminous producing and sales interests, and the six allied heating equipment and accessories industries. Activities of the body are limited to the formulation of plans, recommendations, and suggestions to the industries represented, and to the formulation of plans for furthering the aims of the committee itself. Collection and interchange of information and educational data as between its members is one of the more important objectives.

Formation of local co-operative associations is an integral part of the committee's plan. In 1930, such groups were organized in Peoria, Ill.; St. Louis, Mo.; and Cincinnati, Ohio. These local associations, as a rule, are stressing education of both their members and the public—the former by courses in combustion and heating-plant design and operation, and the latter by newspaper publicity, calling attention to the convenience and economy of coal when burned in modern automatic equipment. Including the three cities mentioned, preliminary plans of the Committee of Ten call for the formation of local groups in 25 of the leading cities of the country.

IN ADDITION to this general co-operative movement, producers' groups in a number of localities have undertaken campaigns to combat particularly the inroads of natural gas. Foremost in these local movements have been the operators in the Rocky Mountain and Alabama coal fields. The latter group, late in December, initiated an advertising campaign to run for six months and inform the public of the merits of coal. The first step in the educational campaign was the insertion of full-page advertisements in the principal newspapers of the state on Dec. 29. Public interest also has aligned itself with the producers in the anthracite region, where the chambers of commerce of the principal cities protested against the introduction of natural gas. These protests were reinforced by similar objections on the part of the United Mine Workers, and were successful in that the gas company in question modified its application for a service permit to exclude part of the territory it proposed to serve.

Stokers are the chief weapon by which coal expects to retain its present domestic markets and secure new ones. To measure the extent of the stoker movement, *Coal Age* early this year queried the manufacturers of the country on their sales of machines for heating homes and for use in office buildings, schoolhouses, and similar structures in the years 1928, 1929, and 1930. Returns indicate that sales in 1930 were more than double those in 1929. In the Middle West, Ohio, Illinois, Indiana, and Michigan apparently led all the other states in the number installed, while in the Far West, the machines were most popular in Colorado and Utah, with California turning in a gratifying number. In the East, sales of stokers, largely for burning anthracite, were most numerous in New York, New Jersey, and Massachusetts. Pennsylvania also took a large number of both anthracite and soft-coal machines. Sales were reported for at least 42 out of the 48 states in 1930, and for the District of Columbia as well.

The spread of the stoker in 1930 appeared to hold out great promise for the disposal of the smaller sizes, long a vexing problem in the bituminous industry. In the opinion of Harry H. Kurtz, representing the Stoker Manufacturers' Association, "if enough stokers are sold to balance the demand for sizes, there is absolutely no reason why the operator should not eventually enjoy just as much, if not more, profit on the sale of stoker sizes of coal as on any of the other sizes."

Fine sizes of anthracite also will be benefited by the spread of the automatic stoker, according to Noah H. Swayne, 2d, former executive director, Anthracite Institute. The goal of the anthracite producers, says Mr. Swayne, is the reduction of prices on domestic sizes "to meet competition and to regain and extend the market for those sizes." While immediate reductions would be disastrous to most producers, the increased markets resulting from the movement now under way will in turn reduce the cost of production. To meet the problem of reducing in the near future the burden now borne by the three profitable domestic sizes, Mr. Swayne offered as one alternative, an increased revenue from the smaller unprofitable sizes.

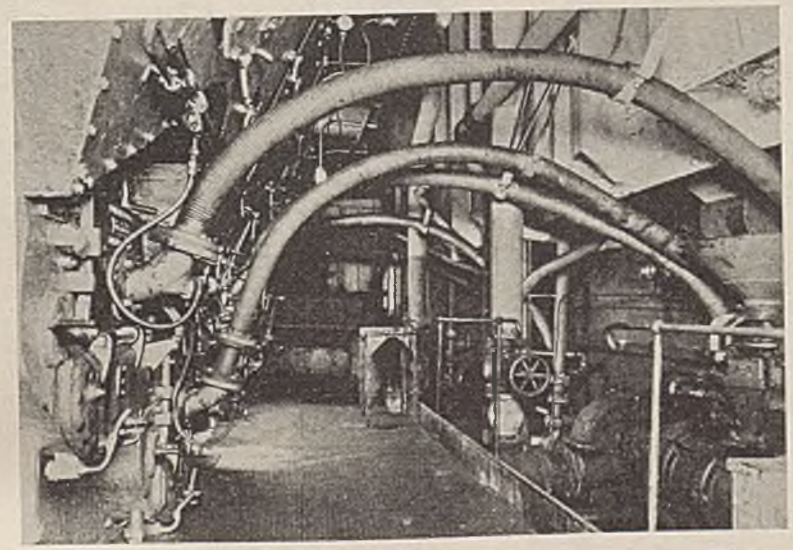


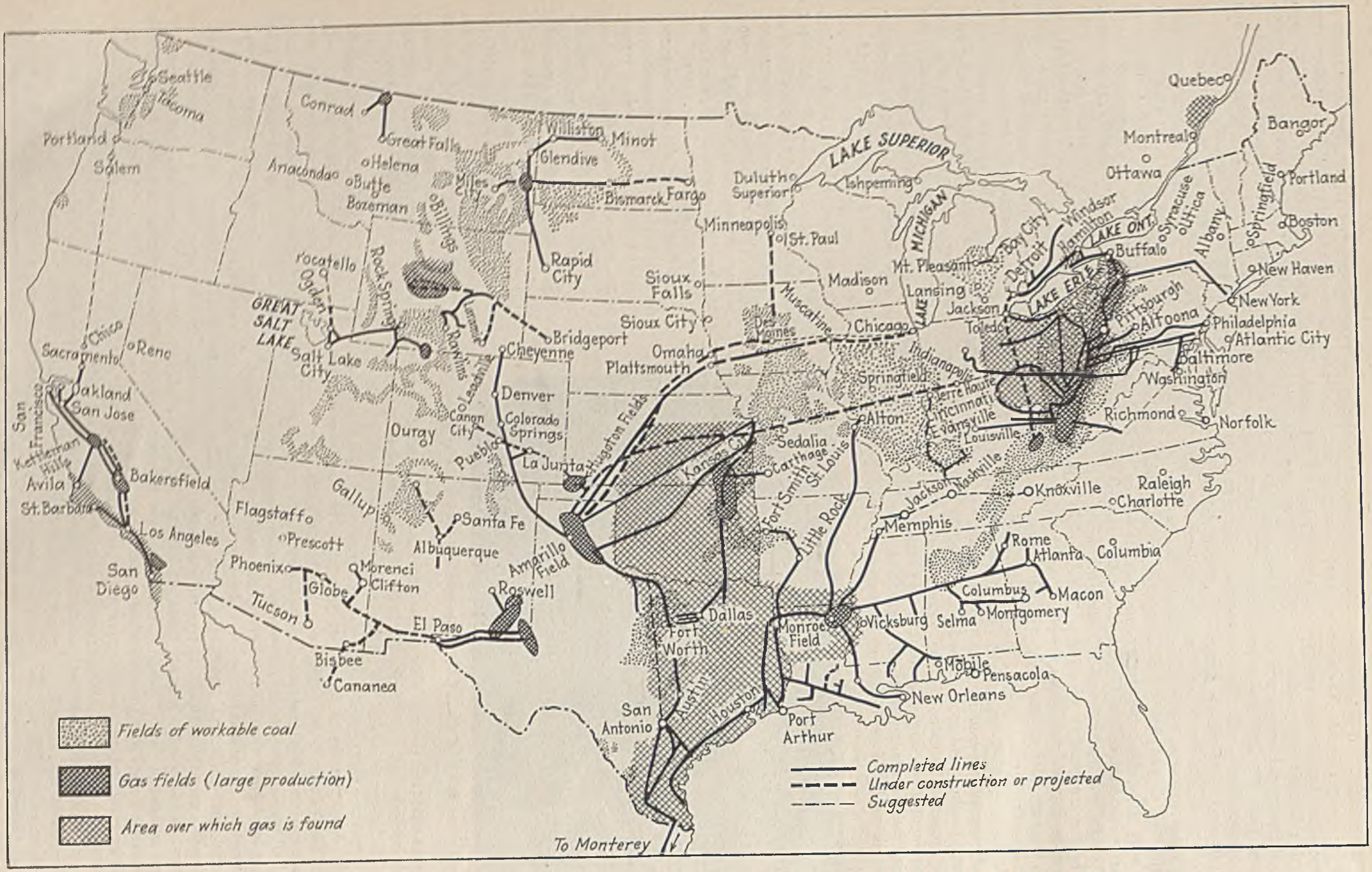
Fig. 2—Fire Room of the "H. F. DeBardeleben." Mills Are at Right

"The trend toward new uses for buckwheat coal in what might be termed a superior type of use is already under way as a result of the increased use of automatic stokers, which have been developed in response to consumers' demands for convenience." Approximately 20,000 domestic anthracite stokers are already in use, he said, and the number is rapidly increasing, with the result that buckwheat is rapidly becoming a domestic fuel. The same trend is noticeable in the still smaller sizes used for heating and power, and, while the change cannot come at once, widening of the trend will make it possible to secure a greater revenue from the finer coal.

The rising tide of substitute fuels brought the question of community of interest as between railroads and coal producers sharply to the front in 1930. Prospects of increasing loss of traffic to competitive forms of transportation, led the carriers late in 1930 to appeal to the government and the public for relief in the form of regulation of parallel transport mediums and a cessation of legislative efforts aimed at a reduction in freight rates. However, despite remarks to the contrary by a few railroad men, the carriers are inclined to discount the inroads of oil and gas competition.

The same position was taken by C. V. Beck, president, St. Louis Coal Co., in an article published in the *Railway Age* of Dec. 13, 1930, and since widely recirculated. Mr. Beck concluded that many of the claims in regard to the supposed advantages of piped fuels are misleading. Basing his conclusions on an assumed cost of 2½c. per 100 miles per M. for transporting natural gas, Mr. Beck asserted that 1c. will purchase the transportation of 7 per cent more heat if shipped by rail as coal than if transported as gas through a pipe line. Gas at its best is a high-priced fuel, he maintained, and automatic stokers are cheaper and rob it of its former advantage of convenience. Mr. Beck also asserted that natural gas does not desire a domestic load, and discounted the prospect of any degree of progress in the industrial field in the face of prevailing levels of coal prices. His estimate of total losses to natural gas was under 25,000,000 net tons.

CONCLUSIONS based on conditions at any time in the past, however, must be re-evaluated in the light of later developments. Increasing losses to natural gas can be stopped only when the desire to compete is eradicated. And as long as legal restrictions on wasting gas and market opportunities exist, gas interests will continue to exert themselves in competition with other fuels. Coal will be the chief sufferer, though there is some satisfaction in the situation in that gas and oil will find themselves striving for each other's markets. The increased activity of gas companies in the last three months furnishes no evidence of



Gas Lines, Installed and Projected, and Gas Fields of the United States Imposed on Map of Workable Coal Areas. (Some of the smaller pipe lines and pipe lines in the congested areas are omitted as of secondary significance) recession. On the contrary, extensions of both main lines and distribution networks lead to the conclusion that activities in this direction will continue with increasing momentum.

Reductions in freight rates, which make up a large part of the cost of coal to the ultimate consumer, have for some time been favored by the coal industry as a competitive weapon. Possibly the first public recognition by a railroad representative of the community of interest of carriers and coal producers in combating oil and gas was given in the address of Conrad E. Spens, executive vice-president, Chicago, Burlington & Quincy R.R., before the annual meeting of the National Coal Association, Detroit, Mich., Oct. 17, 1930, when he said that "it is not entirely within the realm of fiction for a railroad representative to suggest that to meet natural-gas competition it may be necessary to consider only to affected destinations even a lower basis than that established by commissions."

EXECUTIVES of other coal originating carriers, however, show no public enthusiasm on Mr. Spens' suggestion. Railroad presidents asked directly by *Coal Age* whether they favored "a reduction in freight rates on bituminous coal as a means of combating the inroads of oil and gas competition in both the soft-coal and railroad industries," generally answered with a negative, though most of them expressed a desire to co-operate with the producers in solving problems of mutual interest. Beyond this latter, said Daniel Willard, Baltimore & Ohio R.R., "we could not go, even if we wanted to, because of the restrictions of the law." C. E. Denney, Erie R.R., replied that he could not "consistently answer or discuss" the question, while Julien L. Eysmans, vice-president, Pennsylvania R.R., stated that his road was "averse to entering into any controversy with respect to the merits of the matter."

A. C. Needles, Norfolk & Western Ry., wrote that "our judgment is that to meet competition of oil and gas, general reductions in rates on coal are neither necessary or desirable." Coal rates are at present at a low level, he remarked, and should not be further reduced unless a competitive situation justifies or compels it, and then not so low as to place a burden on other traffic. The Chesapeake & Ohio Ry. and the Pere Marquette Ry., according to J. J. Bernet, are not prepared to say "what definite and final action will be taken to meet present and future developments."

Western railroads were openly skeptical of the value of rate reductions, though all were of the opinion that the situation requires careful study. Among the officials who felt that the question could not be answered without further consideration were: Fred W. Sargent, Chicago & North Western Ry.; H. A. Scandrett, Chicago, Milwaukee, St. Paul & Pacific R.R.; Ralph Budd, Great Northern Ry.; and C. R. Gray, Union Pacific System.

In the Southwest, wrote W. B. Storey, Atchison, Topeka & Santa Fe Ry., lines are being built or proposed to furnish gas for industrial purposes at a price so low as to "shut out any possibility of coal competition," while "the prices for gas for domestic purposes in the same localities were so high that the domestic consumer would invariably use coal, providing price was the main consideration." Fuel oil has not presented quite so critical a problem to the Santa-Fe, though there is direct competition between the two.

"Generally speaking, readjustment of rates does not appear to be in any sense the controlling factor" in oil and gas competition, says J. M. Kurn, St. Louis-San Francisco Ry. "The disappearance in our territory, of course, is not so much domestic as it is steam coal, and furthermore the involvement is principally at points where large steam users are located. I am not at this time in favor of any marked readjustments in freight rates, for the reason that no studies have yet been produced showing the extent to which the readjustment should go, in so far as freight rates are a factor. But the principal reason in the involvement of freight rates is beyond or intermediate with the points where competition exists, which involvement represents a revenue which would be unnecessarily adversely affected."

"Competition [of pipe lines] is becoming so widespread and coal rates are so finely adjusted that the question is one of general reductions of freight rates on coal," writes L. A. Downs, Illinois Central System. "Such a general reduction, uncompensated by increased rates on other commodities, would be a staggering blow to the already heavily battered earning power of the railroads, and there is no assurance that it would provide more than temporary relief to the coal industry." The problems of operators and railroads will have to be worked out along two lines, he concluded. "One is education of the public to appreciate true values in both fuel and in transportation. The other is the removal of unfair competitive handicaps in both industries."

Railroads in the territory covered by the Wabash should not be called upon at the present time to reduce coal rates, was the opinion expressed by J. E. Taussig. In the last ten years, he said, the Wabash had had nothing but reductions as the result of orders issued by various commissions. "It should also be borne in mind," he adds, "that there were a great many voluntary reductions on the part of the carriers from time to time during this period, and this is sufficient reason, I believe, for taking the position that it would be unfair to ask the railroads to proceed further along the line of reductions.

"Personally, I think that there has been too much said about the natural-gas invasion and competition of oil. While these are factors to be considered, I still feel that with the growth of the country there will be a large consumption of soft coal."

Increasing progress in the use of pulverized coal adds a gratifying note to the review of 1930. The trend of use, as shown in the chart in Fig. 4, developed by the Pulverized Fuel Equipment Co., is steadily upward, and is distinguished by installation of the system in an increasing number of general manufacturing plants. According to views of the equipment manufacturers, which are borne out by the Census reports, the individual mill is rapidly outstripping the storage system, though the latter has a well-defined field of use.

Individual mills have been devel-

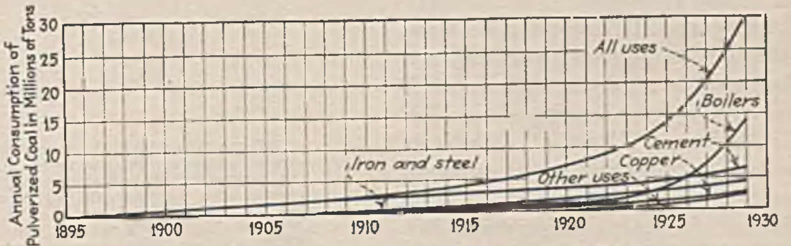
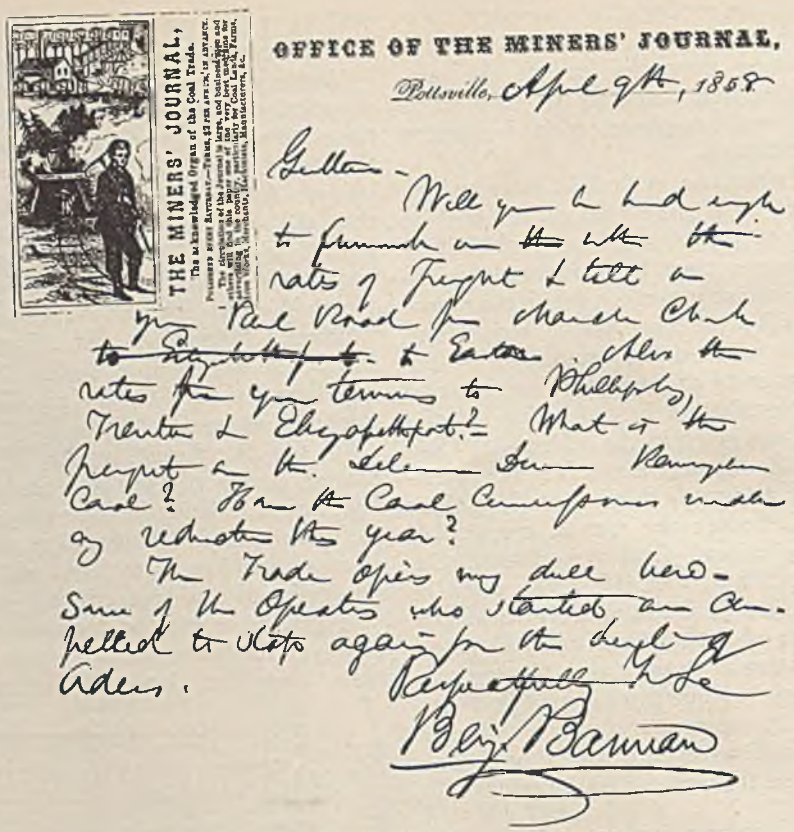


Fig. 4—Growth in the Use of Pulverized Coal

oped, according to estimates, for profitable operation of boilers ranging from 200 to 2,500 boiler horsepower. The upper limit is somewhat indefinite, but it seems apparent that the storage system is more satisfactory for capacities above 2,500 boiler horsepower. Use of water-cooled walls, a comparatively recent development, and refinements in burner design allow the liberation of a greatly increased quantity of heat per unit of space, with a corresponding decrease in furnace volume. This development is not without its drawbacks for the coal industry, however, as furnace design is such that gas or fuel oil may be used. Size of plants using pulverized coal increased markedly in 1930. One installation, rated at 750,000 lb. of steam per hour, has produced over 1,000,000 lb., and plants having an evaporative capacity of over 300,000 lb. of steam per hour were fairly common.

Advances in the marine use of pulverized coal compared favorably with those made in stationary use in 1930. Five vessels were equipped in 1930, as follows: "Pacific Monarch" (towboat), operating on the Pacific Coast; "J. R. Sensibar," Great Lakes; "Lorain," Atlantic Ocean; and "Berwindvale" and "H. F. DeBardeleben," Atlantic Coast. The "Berwindvale" is operated by a subsidiary of the Berwind-White Coal Mining Co., while the "H. F. DeBardeleben" is owned by a subsidiary of the DeBardeleben Coal Corporation. All these vessels were equipped with the new Todd "Triplex" mills, a combination of three individual mills, in one case to reduce the number of bearings and minimize the displacement of parts caused by strains and rolling of the vessel. The "Lorain" also is equipped to burn either coal or fuel oil.


THE MINERS' JOURNAL,

OFFICE OF THE MINERS' JOURNAL,

Pottsville, April 9th, 1858

Gentlemen,— Will you be kind enough to furnish me with the rates of freight & toll on your Rail Road from Mauch Chunk to Easton. Also the rates from your terminus to Philipsburg, Trenton & Elizabethport? What is the freight on the Delaware Division Pennsylvania Canal? Have the Coal Companies made any reduction this year?

The Trade opens very dull here. Some of the Operators who started are compelled to stop again for the want of orders.

Respectfully Yours

Benj. Bannan

Where to sell all the coal the mines could produce is no new problem. As intimated in the concluding paragraph of a 70-year-old letter written by Benjamin Bannan, editor, the *Miners' Journal*, it was as pressing in 1858, when the production was 13,974,478 tons, as in 1930, with its combined anthracite and bituminous output of 531,432,000 tons. The letter reads:

"Gentlemen:—Will you be kind enough to furnish me with the rates of freight and toll on your railroad from Mauch Chunk to Easton. Also the rates from your terminus to Philipsburg, Trenton and Elizabethport? What is the freight on the Delaware Division Pennsylvania Canal? Have the coal companies made any reduction this year?

"The trade opens very dull here. Some of the operators who started are compelled to stop again for the want of orders."

Reproduction of this letter from the editor of one of the earliest ventures in coal trade journalism was made possible through the loan of the original by a friend of *Coal Age*.

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CLEARING SKIES

For Business in 1931

(*Continued from page 56*)

country, omitting two that were accompanied by serious derangements of the currency, have averaged close to 24 months in length from the time business dropped below normal until it returned to the normal line again. During these depression periods the level of business activity averaged about 10 per cent below normal. If we count this depression as running from December, 1929, when the business curve dropped under the normal line, we should expect the curve to be back to normal by the end of this year. If we make some allowance, however, for the fact that the depression during the first half of 1930 was very mild, it might run two or three months longer. That would bring recovery to a normal level by about March, 1932.

On this basis the depression is about half over. Certainly all the indications are that the level of business during December was about at the bottom. So far in January the trend has been running true to form, with a slight improvement over the December level. If no new outside factors come in to alter the situation, it is reasonable to expect slow and fairly steady improvement this year.

This leaves out of consideration the possibility of unforeseen disturbances in the international situation such as war threats, collapse of governments, social disturbances, or increased labor troubles abroad or here. Such things, or a continuation of the drought conditions, which are by no means over, undoubtedly would tend to retard recovery.

On the other hand, changes in domestic banking policies would be a most potent factor tending to hasten recovery. There is an almost unprecedented abundance of investment funds now largely idle in time deposits or low-yield, short-term securities, and the banking system as a whole is in the most liquid position in years. If the banking authorities act, as they can in various ways, to lower and keep down the market rate of interest on long-term loans, so that investors are brought to realize that the days of high long-term interest rates are over, buyers and users of capital goods here, and especially abroad, will be willing to borrow and bring the enormous surpluses of industrial funds into productive use. There are a few faint signs, particularly the improvement in the bond market since December, that this is beginning to happen. When it gets fully under way we shall be entering another period of business expansion.

COAL SPENDS

+ Over Billion Dollars in 1930

DESPITE decreased production, the coal industry of the United States in 1930 spent in excess of $133,000,000 for materials and supplies necessary to the current operation of the mines. This figure excludes all charges to the capital account for permanent improvements and betterments, as well as payments for purchased power, explosives, and wages.

While the estimated totals for expenditures for materials and supplies, purchased power, and wages are below those of 1929, the total outlays for these services, plus payments for merchandise for resale in company stores, were sufficient to bring the buying power of the coal industry in 1930 above the billion dollar mark. Mine workers, it is estimated, received more than $750,000,000 in 1930. Expenditures for purchased power, it is estimated, exceeded $41,000,000.

Data collected by *Coal Age* indicate that the total expenditures for material and supplies by bituminous producers was over $97,000,000. Reduced to a per-ton basis, this averaged 21.0c., as compared with the revised estimate of 20.5c. for 1929 and the Census Bureau figure of 30.5c. per ton in 1919. The year 1919 was one of high prices; with the exception of the boom year of 1920, the commodity price index was at its highest. Also, the 1919 figures probably include expenditures for explosives, which were not determined by the *Coal Age* survey.

The anthracite industry, according to the survey, spent in 1930 $36,000,000 for material and supplies, exclusive of explosives. Expenditures per gross ton were 58c., as compared to the figure of 76c. reported by the Census Bureau for 1919. The reduction of 9.5c. in the bituminous figure and 18c. in the anthracite figure reflects the increased attention given to the economical use of supplies by management, and the continued installation of bigger and sturdier mechanical equipment.

Returns had been received up to the time this issue of *Coal Age* went to press from all but four of the coal-producing states of the country. In one additional instance, they were not complete enough for inclusion in the table. These returns covered both captive and commercial operations, with the preponderance of reports from the latter.

The bituminous estimate of 21.0c. per ton for the country as a whole was arrived at by weighting the totals for each state separately on the basis of actual reports received from operators and the estimated output for each state during the past year. Using the estimate of 461,630,000 net tons for the year, this weighting gave $97,143,135 as the total expenditures for material and supplies. Totals for purchased power and wages were arrived at in a similar manner.

Of the returns received which gave data with sufficient detail to make the figures reported available for inclusion in the general compilations, 2.58 per cent were from companies producing less than 10,000 tons in 1930; 17.42 per cent were from companies producing between 10,000 and 50,000 tons; 20 per cent from companies producing from 50,000 to 100,000 tons; 19.36 per cent from companies producing from 100,000 to 200,000 tons; 20 per cent from companies producing from 200,000 tons to 500,000 tons; 10.96 per cent from companies producing from 500,000 tons to 1,000,000 tons; 4.52 per cent from companies producing from 1,000,000 tons to 2,500,000 tons; and 5.16 per cent from companies producing over 2,500,000 tons.

Expenditures for Material and Supplies by Coal Mines in 1930

State	1930 — Estimated Expenditures for Materials and Supplies: Estimated Production Net Tons	Average Per Ton,* Cents	Total for State**	1919 — Actual Expenditures for Materials and Supplies: Actual Production Net Tons	Average Per Ton, Cents	Total for State
Alabama	14,933,000	16.5	$2,463,945	15,536,721	35.0	$5,420,177
Arkansas	†	†	†	1,429,020	50.0	716,615
Colorado	8,054,000	28.0	2,255,120	10,323,420	30.0	3,052,028
Illinois	52,804,000	19.0	10,032,760	60,862,608	25.0	15,345,498
Indiana	15,583,000	18.5	2.882,855	20,912,288	26.0	5,379,400
Iowa	3.493,000	25.0	873,250	5.264,692	31.0	1,758,025
Kansas	2,348.000	11.5	270,020	5,224,724	36.0	1,906,063
Kentucky	50,711,000	23.0	13,906,490	30,036,061	36.0	10,944,940
Maryland	2,649,000	37.0	980,130	3,021,686	31.0	929,325
Michigan	†	†	†	996,545	66.0	664,557
Missouri	3,398,000	14.5	492,710	3,979,798	35.0	1,381,223
Montana	2,664,000	48.0	1,278,720	3,236,369	37.0	1.183,810
New Mexico	1,880,000	35.0	658,000	3,138,756	31.0	975,742
North Dakota	1,862,000	13.5	251,370	840,959	34.0	283,633
Ohio	22.790,000	16.0	3,646,400	35,876,682	25.0	9,105,833
Oklahoma	2.516,000	20.5	515,780	3,802,113	37.0	1,391,771
Pennsylvania	123,240,000	18.5	22,799,400	150,758,154	30.0	44,912,367
Tennessee	5,350,000	20.5	1,096.750	5,213,205	40.0	2,036,127
Texas	†	†	†	1,690,656	23.0	387,953
Utah	†	†	†	4,631,323	34.0	1,564,955
Virginia	11,485,000	10.5	1,205,925	9,326,830	37.0	3.432,448
Washington	†	†	†	2,990,447	46.0	1,376,254
West Virginia	121,318,000	22.0	26,689,960	79,036,553	33.0	25,983,284
Wyoming	5,623,000	44.0	2,474,120	7,219,738	32.0	2,287,971
Totals for United States	‡461,630,000	21.0	$97,143,135	465,860,058	30.5	$142,432,551
§Pennsylvania anthracite	62,323,000	58.0	$36,147,000	78,723,668	76.0	$59,738,376

*Averages derived from actual figures submitted to *Coal Age* by operators.
**Estimated tonnage multiplied by average expenditure per ton.
†Included in totals for the United States.
‡Including other coal-producing states not specifically shown.
§Gross ton basis.

NEW TOPWORKS

+ Construction Active in 1930

ACTIVITY in the construction of new topworks and the rebuilding of old plants in 1930, according to data collected by *Coal Age* direct from the field and also through the co-operation of the manufacturers of equipment, fell only slightly behind the level established in the previous year, in spite of a material decline in coal production and some weakening—in the bituminous industry—in spot price levels. Adverse conditions, apparently, are no bar to the determination of coal producers everywhere to modernize their equipment in harmony with the demands of the present-day market. On the basis of the showing in 1930, activity may be expected to increase materially in the future with the return of normal conditions.

Mechanical cleaning plants with a capacity in excess of 10,665 net tons per hour were built or contracted for in 1930. This figure takes in installations totaling 4,800 net tons per hour in the anthracite field of Pennsylvania, including Menzies hydroseparators with a total of 600 tons per hour not separately reported in the accompanying table and the new central breaker of the Philadelphia & Reading Coal & Iron Co., construction of which was deferred from 1929.

Based on a working day of eight hours and using the government figures of 308 and 303.5 days as the theoretical working years in the anthracite and bituminous industries, respectively, the installed mechanical cleaning capacity in 1930 is 26,087,000 tons. Actually, the total capacity probably will be in excess of that figure, as many operators plan to work these plants more than one shift per day, or shifts more than eight hours long. Moreover, jigs, (except two installations of bituminous mines) and wet tables are excluded. With the 1930 figure, the total installed mechanical cleaning capacity in the three years during which *Coal Age* has conducted its survey of construction is 76,713,000 tons.

Installations of plants for handling coal by the ordinary screening and hand-picking methods in 1930 slightly exceeded the total for 1929 in capacity in tons per hour. Data collected by *Coal Age*, covering the major part of building activities during the year, showed construction with an hourly capacity in excess of 22,375 tons. This figure is exclusive of auxiliary coal-handling equipment installed in connection with new mechanical cleaning plants, and is, like the estimate on mechanical cleaning capacity, under the added capacity made available.

Pennsylvania—anthracite and bituminous combined—retained its lead in new construction last year, outranking West Virginia, its nearest rival, by a wide margin. Bituminous construction in Pennsylvania, however, lagged considerably behind West Virginia. In the anthracite field of Pennsylvania, four new Chance plants were built or started in 1930, including a new plant of the Hudson Coal Co. and the St. Nicholas central cleaning

New Topworks Construction in 1930§

Coal Company	Plant Location	Capacity, Net Tons Per Hour	Preparation Equipment
Alabama Fuel & Iron Co	...	150	...
Allegheny River Mining Co	Cadogan, Pa	100	Hydrotator[1]
Alpha-Pocahontas Coal Co	Alpoca, W. Va	150	Kanawha
American Coal Co. of Allegany County	McComas, W. Va.(8)	450	American,[2,3]
	McComas, W. Va	50	Roberts & Schaefer[4]
Amherst Coal Co	Amherstdale, W. Va	250	Kanawha
Barnes & Tucker	Barnesboro, Pa.(2)	120	Roberts & Schaefer[4]
Baukol-Noonan Lignite, Inc	Noonan, N. D	400	Pittsburg B. & M.
Bear Canon Coal Co	Bear Canon, Colo	80	...
Benedict Coal Corporation	St. Charles, Va	450	Morrow
Berwind-White Coal Mining Co	Windber, Pa	400	Roberts & Schaefer[4]
Bethlehem-Fairmont Coal Co	Shinnston, W. Va	150	Fairmont[5]
Bethlehem Mines Corporation	Barrackville, W. Va	400	Fairmont
Big Vein Coal Co	Buckskin, Ind	125	Roberts & Schaefer[4]
Black Diamond Coal Co	Lathrop, Ohio	200	...
Black Diamond Coal Mining Co	Whitwell, Tenn	...	...[6]
Blackwood Coal & Coke Co	Blackwood, Va	250	Fairmont
Blue Diamond Coal Co	Bonny Blue, Va	300	Fairmont
Bradshaw Coal Co	Bradshaw, W. Va	75	American[2]
C. C. B. Smokeless Coal Co	Stotesbury, W. Va.(2)	80	Roberts & Schaefer[4]
	Helen, W. Va	500	Kanawha
	Helen, W. Va.(2)	100	Roberts & Schaefer[4]
Cambridge Collieries Co	Cambridge, Ohio	300	Roberts & Schaefer
Cannelton Coal & Coke Co	Cannelton, W. Va	400	Kanawha
Carnegie Coal Co	Atlasburg, Pa	300	Pittsburgh C. W.
Carnegie Steel Co	Clairton, Pa	600	Rheolaveur
Central Coal Co	Danville, Ill	20	...
Clayton Coal Co	Erie, Colo	2,000*	...
Clinchfield Coal Corporation	Clinchco, Va	350	Roberts & Schaefer
Clinton Coal Co	Clinton, Ind	300	Morrow
Colorado Fuel & Iron Co	Salida, Colo	300	...
Colorado & Utah Coal Co	Mt. Harris, Colo	400	...
Commercial Fuel Co	Pittsburg, Kan	250	Pittsburg B. & M.
Consolidation Coal Co	Coalwood W. Va	5,000*	Fairmont
Coxe Bros. & Co., Inc	Beaver Meadow, Pa	200†	Chance
Crystal Block Mining Co	Lobata, W. Va	75	American[2]
Detroit Mining Co	Gordon, W. Va	50	American[2]
Elkhorn Collieries Corporation	Thornton, Ky	125	Morrow
Ellis Coal Co	Pittsburgh, Pa	125	...
Essex Coal Co	Syracuse, Ohio	200	...[6]
Ford Collieries Co	Curtisville, Pa	400	Roberts & Schaefer
Gauley Mountain Coal Co	Jodie, W. Va	200	Kanawha
Glen Alden Coal Co	Wanamie, Pa.(2)	¶	Wilmot[4]
	Ashley, Pa	20†	Hydrotator
	Wanamie, Pa	20†	Hydrotator
Greenbrier Coal & Coke Co	McDowell, W. Va	25	American[2]
Green River Fuel Co	Mogg, Ky	200	...
Gulf Smokeless Coal Co	Covel, W. Va.(2)	100	Roberts & Schaefer[4]
Hanna Coal Co	Fairpoint, Ohio	250	Morrow
Harlan Collieries Co	Brookside, Ky	300	Morrow
Harlan Gas Coal Co	Harlan, Ky	150	...
Harvey Coal Corporation	Harveyton, Ky	300	...
Hocking Valley Mining Co	Hocking, Ohio	180	American[2]
Hudson Coal Co	Carbondale, Pa	800†	Chance
Independent Coal & Coke Co	Kenilworth, Utah	5,000*	...
Indiana & Illinois Coal Corporation	Nokomis, Ill	900	Morrow
Ingle Coal Co	Littles, Ind (2)	150	Roberts & Schaefer[4]
Imperial Smokeless Coal Co	Quinwood, W. Va	350	Kanawha
Island Creek Coal Co	Holden, W. Va.(2)	100	Roberts & Schaefer[4]
Jamison Coal & Coke Co	Greensburg, Pa	150	Fairmont[7]
	Hannastown, Pa	350	Fairmont[7]
Jefferson Coal Co	Piney Fork, Ohio	200	Morrow
E. H. Johnson Coal Co	Spadra, Ark	250	United
Johnstown Coal & Coke Co	Bellburn, W. Va	250	Kanawha
Kentucky Cardinal Coal Corporation	Cardinal, Ky	100	Roberts & Schaefer[4]
Killarney Smokeless Coal Co	Killarney, W. Va	60	American[2,3]
	Killarney, W. Va	50	Roberts & Schaefer[4]

plant of the Philadelphia & Reading Coal & Iron Co. In addition to the construction of Chance plants, a number of anthracite operators supplemented cleaning in jigs by the installation of Menzies hydro-separators and Hydrotators. Nine of the latter were installed by six companies. Nineteen hydro-separators were reported for the year 1930.

In the bituminous coal fields of Pennsylvania, all the installations of mechanical cleaning plants reported were in western Pennsylvania. Included in the list is a Chance plant with an hourly capacity of 480 tons, built at the Coverdale mine of the Pittsburgh Terminal Coal Corporation; two units of an "Aersand" plant, using as a cleaning agent a mixture of air and sand at the Cadogan mine of the Allegheny River Mining Co.; a Rheolaveur plant, capacity 600 tons per hour, at the Clairton plant of the Carnegie Steel Co.; and two Peale-Davis air plants at the Greensburg and Hannastown plants of the Jamison Coal & Coke Co.

Activity in mechanical cleaning in West Virginia was confined almost entirely to the installation of Menzies hydro-separators or American pneumatic separators in existing structures. Twenty-two of the former, with an aggregate capacity of 1,105 tons per hour, were put in by fifteen mining companies in southern West Virginia. None was reported for the northern part of the state. Sales of American tables in West Virginia also were confined to the southern fields. In all, 22 tables were installed by ten coal companies, of which the American Coal Co. of Allegany County, McComas, took eight tables, with an aggregate capacity of 450 tons per hour, and the United States Coal & Coke Co., Gary, installed four, with a capacity of 300 tons.

One Menzies hydro-separator plant was put in in Kentucky in 1930, while the West Kentucky Coal Co., Sturgis, Ky., contracted for an American air plant of three tables with an aggregate capacity of 200 tons per hour. In Ohio, the Hocking Valley Mining Co., Hocking, took two American tables with a capacity of 180 tons. Three Menzies hydro-separators, capacity 275 tons per hour, went into Indiana, and two were purchased by Barnes & Tucker, Barnesboro, Pa.; capacity, 120 tons per hour. In the Southwest, the Reliance Coal Corporation, Reliance, Mo., bought a Montgomery coal-washing plant with a capacity of 200 tons per hour.

Most of the new installations of 1930 are shown in the accompanying table, which gives the name of the operating company, the location of the plant, and its capacity in tons per hour. The table does not include, however, six tipples reported by bituminous companies which desired that their names be withheld. Where construction included the installation of a cleaning plant, that fact and the system installed is indicated, though not in all cases does the total capacity consist entirely of the particular equipment mentioned. If more than one cleaning unit was installed, the number is given in parentheses directly after the plant address.

Southern West Virginia led the country in 1930 in the construction of plants for screenings and hand-picking coal, with nearly one-fourth of the total installed capacity. Northern West Virginia was far behind, with only a few scattered plants reported. Pennsylvania, the largest producer of bituminous coal in 1930, ranked a poor second to West Virginia, with a little less than half its installed capacity.

The summary of new construction in 1930 was made possible through the co-operation of the following manufacturers of equipment (abbreviations given in the table follow the names in parentheses): Koppers-Rheolaveur Co. (Rheolaveur); Pittsburg Boiler & Machine Co. (Pittsburg B. & M.); Roberts & Schaefer Co. (Roberts & Schaefer); Fairmont Mining Machinery Co. (Fairmont); H. M. Chance & Co. and the Chance Coal Cleaner (Chance); Morrow Manufacturing Co. (Morrow); United Iron Works, Inc. (United); American Coal Cleaning Corporation (American); Webster Manufacturing Co. (Webster); Pittsburgh Coal Washer Co. (Pittsburgh C. W.); Kanawha Manufacturing Co. (Kanawha); Hydrotator Co. (Hydrotator); and the Wilmot Engineering Co. (Wilmot).

New Topworks Construction in 1930—*Continued*

Coal Company	Plant Location	Capacity Net Tons Per Hour	Preparation Equipment
Lamar Collieries Co	Lamar, W. Va	110	American[2]
Leccony Smokeless Coal Co	Besoco, W. Va	250	Roberts & Schaefer
Lehigh Navigation Coal Co	Hazleton, Pa	400†	Chance
Lehigh Valley Coal Co	Hazleton, Pa (2)	70†	Hydrotator
	Wilkes-Barre, Pa	¶	Wilmot[4]
Lincoln Coal Co	Nanty-Glo, Pa	200	Webster
Lincoln Gas Coal Co	Lincoln Hill, Pa	200	Pittsburgh, C. W.
MacAlpin Coal Co	McAlpin, W. Va	60	American[2,3]
Majestic Coal Mining Co	Hackett, Ark	100	....
Malakoff Fuel Co	Malakoff, Texas	100	Pittsburg, B. & M.
Manbeck Coal & Ice Co	Schuylkill Haven, Pa	30†	Hydrotator
Mary Helen Coal Corporation	Coalgood, Ky	400	Pittsburgh, C. W.
McDowell Coal & Coke Co	McDowell, W. Va	50	Roberts & Schaefer[4]
Mead Smokeless Coal Co	Mead, W. Va	75	Roberts & Schaefer[4]
	Mead, W. Va	100	American[2,3]
Mill Creek Coal & Coke Co	Krag, W. Va	350	Fairmont
Millburn By-Product Coal Co	Milburn, W. Va	250	Kanawha
Moffat Coal Co	Sparta, Ill	500	Link-Belt
New River & Pocahontas Consolidated Coal & Coke Co	Caples, W. Va	100	Fairmont
National Fuel Co	National, W. Va	250	Fairmont
Panther Creek Mines, Inc	Auburn, Ill	300	Roberts & Schaefer
Pemberton Coal & Coke Co	Affinity, W. Va. (2)	50	Roberts & Schaefer[4]
Pennsylvania Power & Light Co	Harrisburg, Pa	40†	Hydrotator
Philadelphia & Reading Coal & Iron Co	Gilberton, Pa	2,000†‡	Chance
	Locust Summit, Pa. (2)	80†	Hydrotator
Phoenix Coal Co	Nelsonville, Ohio	125	....
Pittsburgh Terminal Coal Corporation	Coverdale, Pa	480	Chance
Pittston Co	Scranton, Pa. (12)	¶	Wilmot[4]
Pocahontas Fuel Co	Bishop, W. Va	5,000*	Link-Belt
Porter Coal Co	Adamsville, Ala	100	....
Potter Coal & Coke Co	Greensburg, Pa	300	....
Premier Coal Co	Middlesboro, Ky	100	....
Princeton Mining Co	Princeton, Ind	600	Roberts&Schaefer[4,8]
Pschirrer & Sons Coal Co	Canton, Ill	100	....
Reliance Coal Corporation	Reliance, Mo	200	Pittsburg B. & M.[9]
Republic Coal Co	Roundup, Mont	300	Pittsburg B. & M.
Reppert Coal Co	Flemington, W. Va	150	Morrow
South-East Coal Co	Laviers, Ky	200	Fairmont
Southern Collieries Co	Williamsburg, Ky	250	Morrow
Strange Coal Co	New Philadelphia, Pa	40†	Hydrotator
St. Louis Coal Co	Coulterville, Ill	300	....
Sunday Creek Coal Co	Millfield, Ohio	400	Morrow
Susquehanna Collieries Co	Mt. Carmel, Pa	¶	Wilmot[4]
	Williamstown, Pa. (2)	¶	Wilmot[4]
Tamaqua Gap Coal Co	Tamaqua, Pa	¶	Wilmot[4]
Truax-Traer Coal Co	Wilton, N. D	500	Pittsburg B. & M.
Turkey Gap Coal & Coke Co	Springton, W. Va	50	Roberts & Schaefer[4]
United States Coal & Coke Co	Gary, W. Va. (4)	300	American[2,3]
Utah Fuel Co	Clear Creek, Utah	1,500*	....
Wells-Elkhorn Coal Co	Garrett, Ky	125	Morrow
West Kentucky Coal Co	Sturgis, Ky (3)	200	American[2,3]
West Virginia Coal & Coke Corporation	Omar, W. Va	90	American[2,3]
Weyanoke Coal & Coke Co	Arista, W. Va	75	Roberts & Schaefer[4]
Williams-Pocahontas Coal Co	Coopers, W. Va	50	Roberts & Schaefer[4]
Winding Gulf Collieries Co	Winding Gulf, W. Va. (4)	150	Roberts & Schaefer[4]
Windsor Coal Co	Windsor, Mo	350	United
Winifrede Block Coal Co	Nolan, W. Va	75	....
Wyatt Coal Co	Eskdale, W. Va	300	Kanawha
Youghiogheny & Ohio Coal Co	Rayland, Ohio	500	Morrow
	Meadowland, Pa	325	Roberts & Schaefer

1 "Aersand process"—two units. 2 American pneumatic separators. 3 Tube-type dust collectors. 4 Menzies hydro-separators. 5 Vibrating screens. 6 Elmore jigs. 7 Peale-Davis pneumatic separators. 8 Bradford breakers. 9 Montgomery jigs.
*Tons per day. †Gross tons per hour. ¶Included in total elsewhere. ‡ Construction deferred from 1929.
§Also includes new major installations of preparation equipment in existing structures.

THE BOSSES TALK IT OVER

Shifting Jobs—

When Is It Advisable?

"WHERE to, John?" inquired Mac, who, in company with the super, met the North Main entry man on the manway.

"Home," answered the worker. "Tom's machine broke down again last night before he got my entry cut."

"That's too bad," remarked the super to John. Turning to the foreman, he asked, "Have you told Mike to get busy on that machine, Mac?"

"Yes," replied Mac quietly, and in a higher voice he called back to the worker, "Heh, John! There's a job for you today cleaning track on A heading off the West."

"Fine; I'll take it," agreed the worker.

The two bosses walked on for a while; finally Jim broke the silence. "You shouldn't have put John to work on that cleaning job, Mac."

"You know why I do those things, Jim," countered the foreman.

WHAT DO YOU THINK?

1. What reasons had Mac for putting John to work?

2. Was Jim justified in protesting Mac's decision, and why?

3. What do you do under similar circumstances?

4. Should the company have a policy covering matters of this kind?

All superintendents, foremen, electrical and mechanical men are urged to discuss the questions on page 94. Acceptable letters will be paid for ▸▸▸▸

How should payroll overdrafts be controlled? This is the question over which Jim and Mac argued in January. How the readers of *Coal Age* would settle the matter is told in the letters following.

Spending Before Earning Should Be Discouraged

CONCLUSIONS cannot be drawn from the experience of 1930, but should be based on a normal year. The past year has proved that we are living beyond our means. If an automobile salesman approaches you to sell a car, and you say you do not have the money to buy a car, he will laugh and say, "That's easy; the finance company will take care of that. Everybody buys that way." Why should a man buy an automobile if he does not have the money? Yet many commodities are bought that way and so a man's pay is spent before he receives it.

The coal operator attempts to pay his men a fair wage, a wage which, if accompanied with thrift, should provide a good living and a savings account. The chief cause of overdrafts is spending of money before it is gotten, whether by a miner dealing at the company store or by an industrial worker dealing at the corner store. The individual can avoid overdrafts by exercising economy and thrift, and by curbing the habit of buying on credit. It is just as easy to stay one jump ahead of the payroll as it is to be one jump behind. The company store is the indirect cause of overdrafts in allowing men to spend before earning. CHARLES BURGET.

Philadelphia, Pa.

First Ascertain Responsibility

DURING dull periods men living in company houses should be given preference in the distribution of work, as they generally do not have the same opportunity of growing foodstuffs that men have who rent a house with a few acres of ground outside the company town. It is, however, a poor policy to extend credit to a worker whose responsibility has not been ascertained by inquiry and by keeping check on his willingness to earn. Unfortunately, in prosperous times few mine workers attempt to save anything, but live up to the last dollar. If they would economize during good times, as they do during slack times, there would be few men on the payroll with an O.D., and the unfortunates could be carried along nicely.

One of the evils comprising the problem is waste. Many a miner's wife can throw away more with a teaspoon than her man can bring in with a coal shovel. The stores can help out by buying certain commodities in large quantities and offering specials at prices below those possible to the small merchant, and thus give more for the money. All in all, the question requires much study from many different angles.

Smithfield, Pa. F. O. NICHOLS.

Credit Preferences Blamed For Many Labor Difficulties

IN discussing payroll overdrafts, or "flickering on the solid," as it is called by the miners of this field, it should be borne in mind that all mining communities are not alike. There is the isolated mining community, where the mining company had to build the town on company property. Then again, there is the community in which the company has built houses for a portion of its employees, leaving a number to live and trade in surrounding districts. There is the mining plant near a fairly populous district where no houses for employees are provided except perhaps one or two for the night boss and night engineer. Trains and cars supply transportation. Usually this type of mining plant has no company store and its employees trade in town with local merchants. It can be seen, therefore, that what would be a splendid scheme in dealing with overdrafts in one instance would not be suited to the other cases.

Our men live in near-by towns for the most part. We have no company store. At the mine is carried a stock of tobacco, candy, soft drinks, overalls, work shoes, etc., for the men's convenience, which are paid for by checkoff through the payroll. We permit no overdrafts. If an employee has money coming to him and wants to draw it before pay day, he can do so by paying a percentage to cover the extra bookkeeping.

Of course, this would not work in an isolated mining community where the town is owned by the company and the men do all their trading at the company store. It is only right that in such a case the company should tide its men over slack periods. However, I cannot agree that the men who have been most thrifty should be penalized, and this is what Jim proposed. Such actions led to unionization, and rightly so. The thing to do in slack periods when the men are asking for credit is to see that they get necessities, not luxuries, and continue along the same line until their bill is paid.

Any plan such as Jim suggests is bound to hurt the discipline Mac has over his men. Instead of the company getting its money back, it is losing more. Where men have been in debt to the company I have heard them brag that the boss could not fire them. You will agree that a condition of this kind is intolerable. THOMAS JAMES.

Vincennes, Ind.

That the Store May Thrive

IF AN employee has demonstrated that he is honest, that his work in and about the mines is of good quality, and it becomes necessary through non-operation of the mines to grant him an overdraft, this should be promptly and cheerfully done. But he should not then be given preference in work over others who have been a little better managers and have accumulated funds to tide them over while business is bad at the mines. By giving this employee who has the overdraft preference in extra work, it appears as if a premium is being attached to bad management and possibly laziness. All other items being equal, I do think employees who live in company houses should have preference over those who reside in houses owned by outsiders. Nevertheless, overdrafts on the payroll are optional and can be eliminated.

There are in the industry today far too many operators who consider the actual production of coal as secondary to merchandising, house rentals, etc. These operators are the ones who are invariably first to cut the selling price of coal in order to keep up mine operation and in turn allow their employees funds to spend with the company's other activities. They have made the going hard for the majority.

VAN B. STITH.

High Coal, W. Va.

Is Mine Operation a Side Line?

MEN who are overdrawn on the payroll as a general rule are drifters. They are not willing to give a day's work for a day's pay, and the sooner they are rid of, the better. It is safer to lose a small store account than to keep men on the "pension" list for a month or two only to lose the principal loaned.

Men who own or are paying for their homes and who draw at least a part of their pay each period are the men who deserve credit. The company will do well to help them, as they are the men who work steadily and keep the tonnage up. I equalize the pay by working every shift man on turn and giving the tonnage men an equal division of cars. Finally, the company that is to stay in business will not operate a mine as a side line to the company store.

Drakesboro, Ky. ROBERT RIVES.

To Pay or Not to Pay

ADVANCEMENTS on pay due constitute a complete chapter in the history of bituminous economics. The stories are many of how workers threatened to quit their employer because they were not given the best places in the mine; how such threats were made only after substantial overdrafts had been established; and how these overdrafts were made the whip in the hands of the worker for use in driving the employer to granting him favors. Fortunately, men of this type are in a small minority. Any man who would stoop so low could not be expected to meet standards on which efficiencies are based. It would be a good idea in normal times to avoid overdrafting altogether.

Linton, Ind. W. H. LUXTON.

Why Credit to Slackers?

BY ALL means, carry the man who works when he can get work, but teach the slacker a lesson by showing him he must pay as he goes. A man who is energetic and tries hard to meet his obligations is sometimes put in an embarrassing position when he sees his insurance lapse, and no funds to meet his daily expense—all because the mine is running part time. He notices the "no goods" are able to get anything they want because they are already in debt. When work picks up and things are going well, these undesirables are off half the time. They know the company will carry them again, and existence is all they want; but the industrious man is on the lookout for a place where he will be appreciated and kept for what he is and not for what he owes.

Milburn, W. Va. R. C. MITCHELL.

Anthracite Has Eliminated The Evils of Overdrafting

IN THE anthracite field credit and overdraft vanished with the passing of company-owned towns, houses, and stores a good many years ago. That correction has been a great help to the companies and also has relieved the workers of worry about overdraft.

Prior to this change, conditions probably were about as chaotic as they are in the bituminous industry today. Ill feelings r volving about overdraft were constantly in the air. The mine foreman was pressed to take care of this man and that man, a procedure which could not be followed without sacrificing another man's job, for which the applicant frequently was not fitted. At the same time the union argued for equalization of work in slack times. When the foreman attempted to take care of overdrafts he was accused of having favorites. One trouble led to another and finally it was agreed that the source of this mental strife should be abolished. Thus disappeared into the past the big problem which continues to bulk large in the path of the bituminous industry. JOHN C. CHIRE.

Hazleton, Pa.

Moving Ahead

Problems dealing with personnel, management and methods are given equal attention in these pages. The answers to these questions are not of the sort found in books and yet they pertain directly to your job, whether you are an operating head or a foreman. By reading and contributing to these pages, you can help yourself, your company, and your industry. Send in your letter today.

Credit to Worthy Employees Is a Profitable Investment

COAL corporations cannot be expected to assume responsibility for every household and its mode of operation. But payroll overdrafts can be controlled by a careful checkup on the caliber of every employee before he is employed. A personnel department is implied. Each applicant might be requested to supply a character reference from the company previously employing his services. A reasonable period might be allowed to investigate the character and trade qualifications of every prospective employee. It is axiomatic to say that a man who cannot run his own household will make a poor employee. For it has been generally recognized that anyone harassed by domestic worries will be a poor risk in concerns controlled by rigid compensation obligations.

Moreover, all employees who qualify, after a careful analysis by the personnel department, should be frankly counselled in the economics of mine operation, and their obligations to the concern. They should be frankly urged to buy or rent a house from the company. Where desirable company houses are available, only those who are willing to assume part of the responsibility of perpetuating the business should be given consideration at all.

I confess, I have little patience with those who are too good to live in comparatively small mining towns, yet are eager to get the best jobs available. But where there are no company houses to be had and employees measure up to all other requirements, they are apt to be excellent risks for a definite period at the stores. In any case, a coal mine operation is a business proposition experiencing many difficulties foreign to any other business. No one can seriously take exception to preferential treatment being shown those willing to assume an active share in the future of the business. Company investments in responsible employees are human values, and good ones, too.

ALEXANDER BENNETT.

Panama, Ill.

Mac Should Not Mix Words; His Record Speaks for Him

MAC, I've been a foreman for many years and I appreciate deeply your disappointment when the inspector criticized your program. You have a good mine; your production is high; your costs, while not low, are good, and your accident record is among the best. These things being true, you should more than welcome an inspector; in fact, every man's work, regardless of position, should bear investigation.

I would say let your record stand for itself. You have every advantage over the inspector. The Old Man is pleased with your success and you can rest assured he is not going to blindly accept criticism of your record.

It appears the safety man has been following the usual procedure of trying to sell his ideas to you personally, but for some reason you have resisted his selling arguments, probably with the idea of forcing him to take his case to the Old Man, and thereby prove yourself right and the inspector wrong.

Your plan is good if you are right, but if the inspector happens to be right, then, Mac, you will have to wear a smaller hat. G. E. DAUGHERTY.

Paintsville, Ky.

Big Men Assert Authority; Weak Men Have It Defined

A SAFETY inspector, although not trusted with supervisory and disciplinary authority, is better fitted to make investigations on hazards, safety practices, and accidents than the mine foreman, who alone should be held accountable for existing conditions. His studies of accidents should include those of a trivial nature and should tabulate and interpret their occurrences. Once a month he should prepare a statement detailing the results of his investigations and recommending preventative measures.

But after all, the primary duties and responsibilities of the safety inspector lie along educational lines. In order to do his job thoroughly he must hold classes in which men are trained in first aid and told of the hazards incident to mining. In this way each individual will become his own safety inspector, a desirable trait in mine workers, since the foreman cannot watch over them at all times.

As to where the authority of foreman and inspector should begin and end without one encroaching upon the other, no third party can definitely fix this. If a man has the strength of character and the ability, he will in time assert himself in his position so that his authority will never be encroached upon. If he is a weakling, he will have to be propped up with an outline of his duties, and others warned not to interfere. Strong men make places for themselves, places with no boundaries and no limitations. Weak men are always asking that their duties be defined.

Happy, Ky. HARRY T. HOWES.

Safety Inspector's Reports Influence Caution in Mine

A SAFETY inspector is just as important as any other man in a mine organization. His duties should be as logically determined as are those of any other important job, on the basis that he is best fitted for certain phases of the work. Certainly, he should be possessed of the influence, if not the authority, to discharge any workman who habitually follows unsafe practices. The mine foreman, with full authority, should immediately attempt to correct unsafe conditions pointed out by the inspector. The superintendent in turn should see that the corrections are made.

It is a good idea for the superintendent to file safety and accident reports numerically and keep them readily available for examination by higher officials. If an accident occurs after an unsafe condition has been reported, responsibility can be shifted to where it belongs and corrective measures taken. The very fact that examinations and reports are made by a safety inspector influences the foreman and his assistants to keep adverse criticisms out of writing.

Stickney, W. Va. W. F. PIOCH.

Foreman Is Too Busy

THERE is a place for both a mine foreman and a safety inspector in every underground operation of any consequence. The mine foreman is lucky if he can devote more than four hours a day to supervising activity and inspecting safety in the working places, so many and varied are his duties of an executive nature elsewhere. The inspector should be under the authority of and report directly to the mine superintendent and thus be under no obligation to the foreman in reporting conditions as they exist. JOHN BOHN.

Oliphant, Pa.

Foreman Gets an Assistant

THE attitude taken by the superintendent and the Old Man seems to be a complex problem to Mac. Apparently his accident record has been too high, with the result that he has been given an assistant with the title of safety inspector. In this case, however, it appears that the groundwork was not adequately prepared for the coming of this new man. Perhaps the situation would have been different if Mac had been notified that the company was starting a drive on safety.

WILLIAM BURGESS.

Paintsville, Ky.

Perhaps the Safety Inspector Is the Management's Man

AN INSPECTOR at times is looked upon as a tough customer to deal with. Where this attitude exists it will be found that the mine foreman and the safety inspector are not co-operating. Both men have duties to perform, some of which are identical, and it is here that contention is found. The inspector's duties sometimes are fixed to overlap and include production and costs, an extension which makes it hard to divide authority between the two officials. Unless the field of the safety inspector is confined to safety alone, his title should be changed and his authority extended to cover the breadth of his activities. It is wrong to parade an operating lieutenant in the guise of a safety inspector.

The Foreman's Mail

Mrs. Sims, the rock boss' wife, told Mrs. Flans that Edwards couldn't run the mine if it wasn't for Hugh, her husband. Mrs. Flans in turn told her man, who considered it a choice bit of news for Edwards. Flans didn't like Sims anyway. But the whole thing turned out bad for the scandalmonger, Flans. When Edwards heard the story, he was more than pleased and told Flans he was glad to know Mrs. Sims felt that way, because Hugh was a good man and he wouldn't know where to find as good a man for the rock work.

Flans boiled over. He said, "I'd like to hear any man say I couldn't run the mine without him if I was boss." Flans was ambitious; so when Edwards was promoted, he was made foreman. As underground boss, he proceeded to get rid of every man who considered himself good. The tonnage dropped 400 tons per day in eight months, and it took the new boss nearly a year to build up the mine to normal tonnage.

Reports to mine foreman and to superintendent should be identical. To issue a verbal report to the foreman and a written report to the superintendent in which are incorporated details not related to the foreman is an invidious practice.

It frequently happens that the mine foreman who is afraid of himself will allow his personal beliefs to interfere with the successful operation of the mine. A man in this predicament is like a cocked gun: he will unconsciously give truth to falsities and almost invariably do the wrong thing in consequence. He will think that the inspector is a barrier and not lend his aid, because he thinks that he can do as well without the inspector. DAVID A. LOSCALZO.

Raleigh, W. Va.

Always Tell the Foreman What You Tell the Super

AFTER you have selected your inspector give him ironclad backing and make your foremen understand that they must work with him if they are to stay on the job. Your inspector will act as a check on your foremen and cut bosses and save many dollars in yardage and supplies; he also will give you better efficiency by increasing the number of official visits to the working places. It is obvious that the more frequently your officials contact the workers, the easier it is to accomplish your purposes.

A daily report should be made by the inspector to the general mine foreman and his section assistant. It is important to be frank in making out section reports. Don't leave the impression that you are trying to put something over on the foreman. A weekly report should be made to the manager.

In some cases the foreman spends too much time at sidetracks and trapper stations. These are not points of vantage for the control of safety. Demands on the foremen for production lead their minds away from detailed considerations of safety. It is unfortunate that some foremen do not act consistently in the practice of safety. When a section assistant knows the day on which the inspector or superintendent will visit his district, he may take the precaution of instructing his men to observe all safety rules, probably with the admonition that they will have a visitor on that day.

Coalgood, Ky. G. R. METCALF.

Here Is Another Scheme

THE inspector should merely assist the mine foreman in enforcing safety measures; he should have the foreman's authority delegated to him, but should exercise this only in the absence of the foreman, and then only in matters relating to safety. It is best to have the inspector report to the mine foreman. W. J. LYKE.

Midway, Pa.

OPERATING IDEAS

From PRODUCTION, ELECTRICAL And MECHANICAL MEN

How Slip Rings on M. G. Set Were Fixed Overnight

When making repairs in the field, it is often necessary to resort to schemes which would not be considered good practice in well-equipped shops. This applies to mechanical as well as to electrical repairs. The extent to which improvisation must sometimes be carried is illustrated by an experience of Grady H. Emerson, of Birmingham, Ala., on a job involving the grinding of the slip rings on a large synchronous motor-generator set at a mine in the Birmingham district. As this machine set was the mainstay of the mine, the management decided the job should be done at night.

On inspection, the rings, which were of cast iron or steel, were found to be both badly scored and pitted. One ring was burned more than the others, and it so happened that the outer ring was the worst damaged. The rings were mounted on tubing with mica insulating washers. In nearly every case of severe arcing on rings there is some defect in the machine insulation, wiring, or in the rings themselves. In testing, the brush rigging was isolated and the wiring was checked for grounds and shorts. Examination showed the wiring and brushholders to be free of ground so the rings were tested for a ground, and a ground was indicated.

Both the machine and rings were blown out with an air hose, but the valve was opened only slightly so as to limit the air velocity. It is not safe to blow electrical machinery with high pressure air. Furthermore, it is not good practice to blow out a machine when it is in motion, for the reason that worn material might be lodged within the frame and be blown between the rotor or armature and the stationary part of the machine. Such results would be disastrous. Someone suggested using oxygen from the torch. That proposal was not accepted because it is unsafe. Oxygen blown into oil, in the right proportions, will cause an explosion or violent fire.

It was found that an insulating washer of the ring had become carbonized. So long had the machine operated in this condition that the rings had burned to the supporting lug, which material is porous and easily broken. The pitted portion was ground smooth before the ring was replaced with an improvised washer of fiber. The voltage was 250 d.c. Three thicknesses of $\frac{1}{16}$-in. fiber will stand up a long time under this voltage if kept clean. Of course, it was impossible to get the ring as true as it was before, but the ring was aligned to the best advantage and then firmly tightened.

A base mounted grinder with fine and coarse wheels was used. The grinder has holes in the base and can be mounted almost anywhere by means of bearing bolts and pieces of scrap iron. The heavier the iron, the better, so some straps intended for reinforcing mine cars were utilized. Holes were placed with the torch and thus the grinder was soon mounted. To run the work fast when grinding with a wheel is not advisable. Neither was it feasible in this case to run the machine under its own power from the d.c. end.

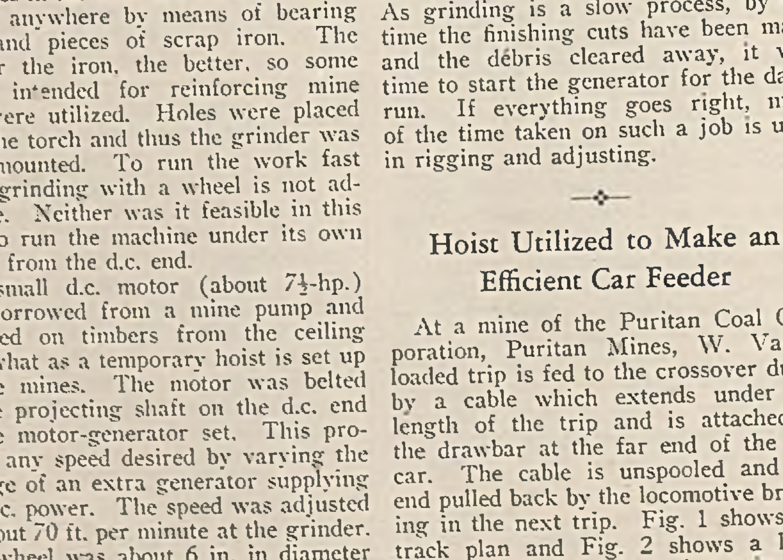
A small d.c. motor (about $7\frac{1}{2}$-hp.) was borrowed from a mine pump and fastened on timbers from the ceiling somewhat as a temporary hoist is set up in the mines. The motor was belted to the projecting shaft on the d.c. end of the motor-generator set. This provided any speed desired by varying the voltage of an extra generator supplying the d.c. power. The speed was adjusted to about 70 ft. per minute at the grinder. The wheel was about 6 in. in diameter and ran at 1,200 r.p.m.

Because dust made by grinding is fine and injurious to electrical machinery, some means must always be provided to keep it out of the machine. To guard against this possible trouble, cardboard was fastened so as just to clear the rotating parts. This shield, with the aid of a 16-in. electric fan, kept most of the dust from the windings, and the machine was blown out thoroughly after the grinding job had been completed. As grinding is a slow process, by the time the finishing cuts have been made and the débris cleared away, it was time to start the generator for the day's run. If everything goes right, most of the time taken on such a job is used in rigging and adjusting.

Hoist Utilized to Make an Efficient Car Feeder

At a mine of the Puritan Coal Corporation, Puritan Mines, W. Va., a loaded trip is fed to the crossover dump by a cable which extends under the length of the trip and is attached to the drawbar at the far end of the last car. The cable is unspooled and the end pulled back by the locomotive bringing in the next trip. Fig. 1 shows the track plan and Fig. 2 shows a locomotive pulling an incoming trip and about to automatically pick up the hook

Fig. 1—Hoist Location With Respect to Dump and Tracks



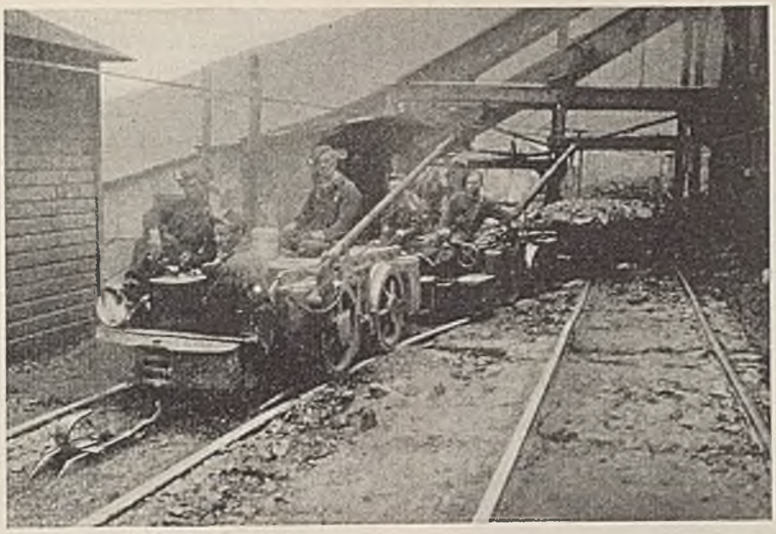


Fig. 2—Locomotive Bumper Is About to Engage Rope Hook

which is attached to the end of the cable. The man who operates the feeder sets the hook on a pedestal between the tracks, so that the point of the hook always makes positive entrance into the lower cavity of the locomotive bumper.

A double-reduction back-geared free-drum hoist winds the rope. It is one which was taken from a stock of used equipment, and has been fitted with a simple device for securing a much higher rope speed for taking up the slack when coupling to a trip of mine cars.

Referring to Fig. 3, one segment of

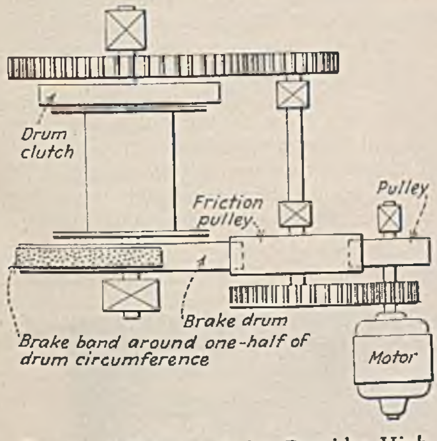


Fig. 3—A Friction Drive Provides High Speed for Taking Rope Slack

the brake band was removed from the drum and a flat face pulley added to an extension of the motor shaft, so that this pulley is in line with the free portion of the drum. Next an idler friction pulley was mounted, with movable bearings, above the space between the drum and the other pulley. By releasing the drum clutch and forcing the friction pulley down with a lever, the drum is driven through the single reduction.

Labor saving in a comparatively short time paid for the installation of the hoist and its control equipment.

Pyrogen Torch Held in Place By Adjustable Holder

An adjustable holder for a gas torch has proved a time saver in stripping armatures and in preheating for soldering commutators in the division repair shop of the Consolidation Coal Co. at Coalwood, W. Va. The holder consists of a flat-weighted base with a riser of 1-in. pipe at the top of which is a street-elbow carrying a pipe flange. Bolted to the flange is a slotted arm to which the torch is attached by spring clips. In the torch supporting arm there is a threaded pipe sleeve which is tightened just to the point where it can be screwed somewhat either way by hand, to adjust the direction of flame projection.

Raising and lowering the torch-supporting end of the holder is done by screwing the flange slightly on the street-elbow. The bolts in the flange can be moved to various holes to make

Torch Holder Displaces a Helper

the flange thread sufficiently tight to hold the weight of the torch without turning.

Pyrogen gas instead of acetylene is used with the oxygen for this work. It does just as well and is considerably cheaper than acetylene, especially if the latter is purchased in tanks rather than generated on the ground. The pyrogen is used also for cutting in the machine shop, but is unsuitable for the welding.

Magazine Travel

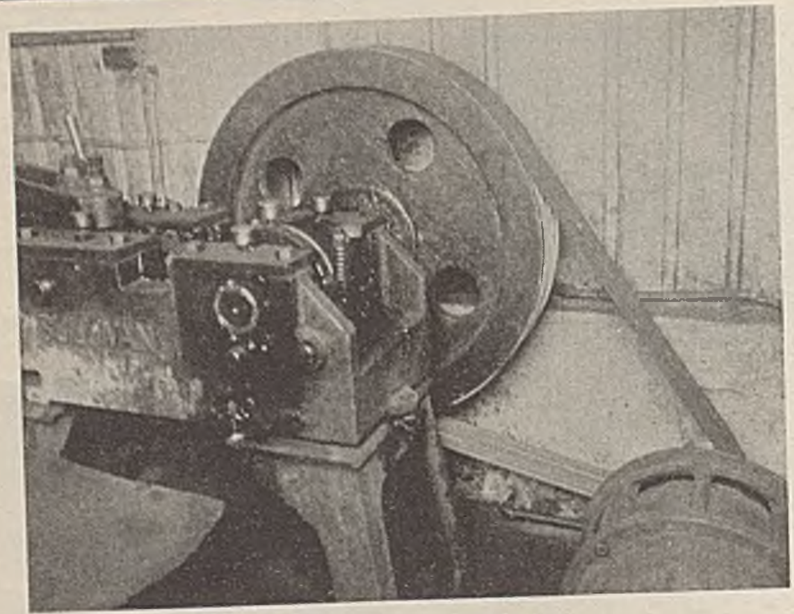
The editors of *Coal Age* traveled long distances last year, and will cover many miles this year in reaching a multitude of plants. In this respect they are more fortunate than the majority of operating men who seldom get away from the job. When an editor visits a plant, he keeps constantly in mind the viewpoints of the reader. What does the reader want to know? is the test question he asks himself in observing the various methods of mine operation. You can help to bring your plant within the view of the other fellow by sending in your tested operating ideas. They will be paid for, $5 or more for each accepted idea.

"V" Belt Adapted to Sharpener By Grooving Flywheel

With individual motor drive, the usual method of connecting a roller type bit sharpener is by flat belt from the flywheel and to a countershaft. At the Auxier mine of the North East Coal Co., Auxier, Ky., the expense of installing a countershaft overhead in a light steel building, where rigid support would be difficult, was obviated by use of a low speed motor and multiple "V" belts.

Instead of going to the expense of purchasing a large-diameter pulley, the machine flywheel was removed to a shop and seven belt grooves were machined in the face. The motor is rated 5 hp. 560 r.p.m. With a relatively small pulley on the motor, the one reduction is sufficient.

Fuel oil for the bit heater is stored in a 1,000-gal. tank buried underground beside the building. It is forced up to the heater by a 3-lb. air pressure maintained by connection through a reducing valve to the shop compressor. A safety valve set to blow at slightly over



"V" Belts and a Low Speed Motor

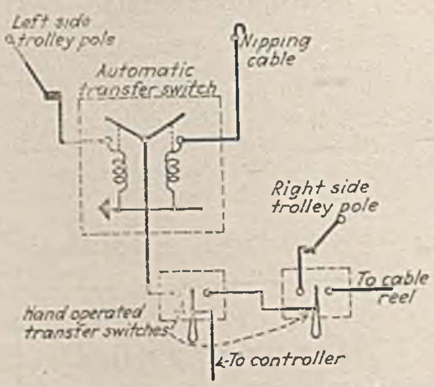
3 lb. is an important safety precaution of the system.

Experience has demonstrated that an underground tank has advantages over an overhead storage tank which provides gravity flow. One is a more uniform temperature of the oil and another is the greater convenience in filling from barrel shipments.

Special Nipping Cable Added To Reel Locomotive

Back-poling is a dangerous practice which, in low places, where the pole cannot be turned, can be avoided only by use of a nip. On gathering locomotives fitted with conductor cable reels the usual practice is to use the end of the reel cable for nipping. Motormen object to this, however, if the nip is of the fused type, because then the arm is strained in holding the extra weight up against the trolley wire. Moreover, to maintain proper fuses in the cable terminal is more difficult when the cable end is used for nipping instead of solely as a terminal connection for operating the locomotive through the cable reel. There are still other objections. The cable heats abnormally because all of it is wound on the reel, and a small additional power loss, due to the extra resistance, also is sustained.

For these reasons a special nipping cable with the necessary transfer switches was specified for several new cable-reel locomotives delivered a few months ago to the Keystone, Tidewater, and Maitland (W. Va.) mines of the Houston Collieries Co., which is controlled by the Koppers Coal Co. To accommodate the four points of feed—right and left trolley poles, cable reel, and nipping cable—three transfer switches are used, as shown in the accompanying wiring diagram. Transfer from left-side trolley pole to nipping cable is automatic, but manipulation of the two hand switches is necessary when selecting either of the other two points of feed.



Four Feed Connections to the Controller

Experience to date indicates that the extra nipping cable is an improvement, but that if the idea is extended to other locomotives in the future an effort should be made to secure a controller which will contain the four transfer points and be housed in an explosion-tested case.

Mine Car Retarder at Dump Reduces Maintenance

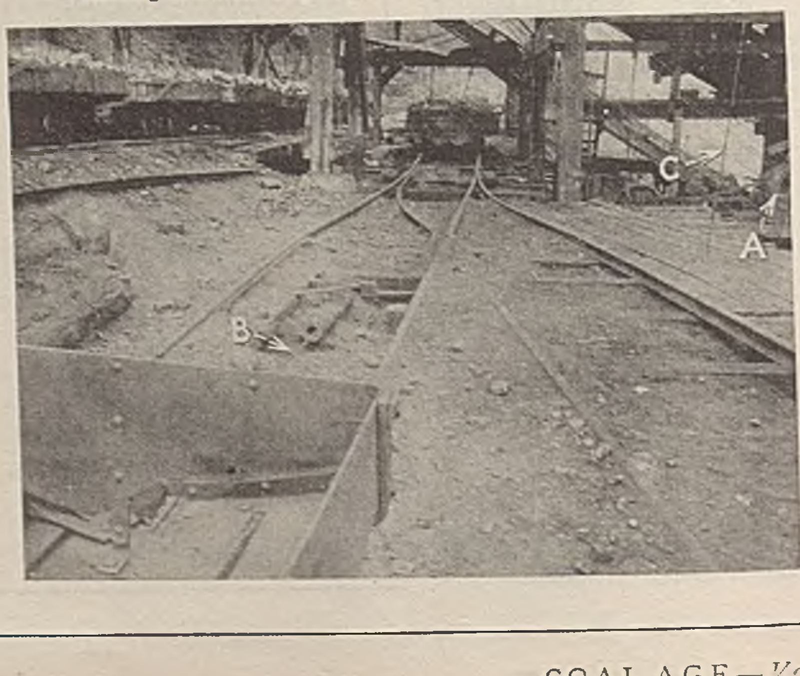
Some of the hardest bumps that mine cars suffer in regular service occur in the "empty hole." Fortunately, the condition readily lends itself to correction. A car running by gravity and hitting another at any great speed suffers a jolt which materially hastens its visit to the repair shop. For this reason and for several others which will be mentioned later, an empty-track car control was installed by the Puritan Coal Corporation at its Thacker seam dumping point, at Puritan Mines, W. Va.

Material for the job was picked up from a collection of discarded and idle equipment. The outfit consists of a car retarder of the wire-rope and drum type, to which was attached a small electric motor for winding the rope back on the drum in preparation for retarding each successive trip of cars. In the illustration, *A* is the drum fitted with weighted brake and motor drive through a clutch, and *B* is a $\frac{1}{2}$-in. wire rope extended from the drum and attached to the first car of a trip being assembled in the empty hole below the cross-over dump.

As each empty car comes from the dump the coupling attendant pulls down on pole *C* long enough to allow the empty trip to move downgrade one car length. By keeping the make-up end of the trip close to the dump the cars gain but little speed before bumping, and all coupling is done at the one point.

The same advantage holds true for greasing, which is a continuous job, be-

Looking From the Empty Hole Toward the Cross-Over Dump



cause the cars are of the plain bearing type. All cars are now greased at one station along the track instead of "anywhere along the track." Spillage of fine coal remaining in angles and crevices is concentrated at the one bumping point, which simplifies the track cleaning.

Frank M. Crum, general superintendent, states that there has been a noticeable decrease in car maintenance since the empty-car-control equipment was installed.

Sighting Spads in Ribs Assist Grading

If grades are to be maintained in the driving of a tunnel through rock, some provision must be made to enable the development crew to take levels at frequent intervals. At the No. 4 mine of the Raleigh Coal & Coke Co., Raleigh, W. Va., where a rock tunnel is being driven into new territory, a system of level taking from monument spads located on the ribs or sides of the opening has assured a high degree of accuracy in the grading, according to David A. Lofpalzo.

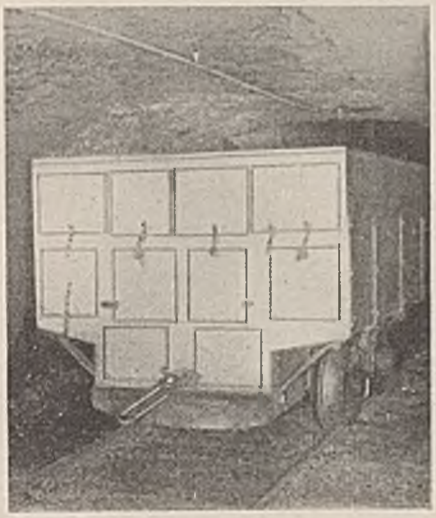
After each round is fired center sights are taken and the grade is checked. In the latter operation, levels are determined by sighting over two horizontal strings tightly stretched from spads in the ribs and disposed at right angles to the direction of advance. This means that there must be two spads in each rib. The spads are placed about 4 ft. from the bottom, a height which is convenient for sighting. Extension of the line of sight establishes a reference point on the face from which the bottom level is determined by measuring down 4 ft.

Any per cent of grade can be established by this method, merely by adjusting the vertical rise or dip for each 100-ft. interval. A light and a plumb bob are used to facilitate the sighting. This method produces a final grading which is so accurate, it is said, that little change need be made, provided proper precautions are taken in the first instance.

Tools for Machine Crews Stored in Locker Car

In No. 86, a shaft mine of the Consolidation Coal Co., Carolina, W. Va., the mining machines with mounted coal drills are operated by battery tanks as permissible units and so are brought back to the main bottom at the end of each shift. Coal augers must be carried with the mining machines and must be taken to the top for sharpening at the end of each shift. For transporting these augers and other tools to and from the mine bottom and the blacksmith shop on top, the locked-compartment tool car illustrated is used.

The car is divided longitudinally into ten compartments with doors at one end



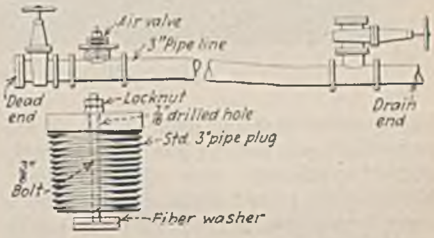
Ready for the Mining Machine Crews to Draw Their Tools

only. The leader of each mining-machine crew has a key to his compartment and the blacksmith who sharpens the tools has a master key for all locks. The car is handled through the auxiliary or man-and-material shaft. It is brought out of the mine in the morning and is sent down with all tools sharpened or replaced at 3 p.m. By this method tools are transported safely up and down the shaft, and inefficiency and argument resulting when machine men are not, or claim not to be, furnished with proper tools is eliminated.

Air Valve Aids Draining Of Water Lines

Frequently it is necessary to shut off and drain long pipe lines. If the drain end is a long distance from the dead end, wise procedure is to open the latter so as to admit air and stimulate flow by gravity. Similarly, when water is admitted to an empty pipe an opening should be maintained at the dead end for the escape of air. This provision is doubly purposeful, since air and water under pressure in a pipe line cause leaks at the fittings and joints.

A plan utilizing a pressure release air valve, which simplifies the duties of the pipe attendant, is described by Charles W. Watkins, of Kingston, Pa. The body of the valve is a 3-in. pipe plug through the center of which is drilled a $\frac{7}{16}$-in. hole for the reception of a valve stem. A $\frac{3}{8}$-in. bolt serves as the stem which freely moves up and down in the hole with a stroke of about $\frac{1}{8}$ in. The head of the bolt or valve stem protrudes from the under side of the plug and a tight fit in the closed valve position is assured by a fiber washer



Details of Air Valve for Water Lines

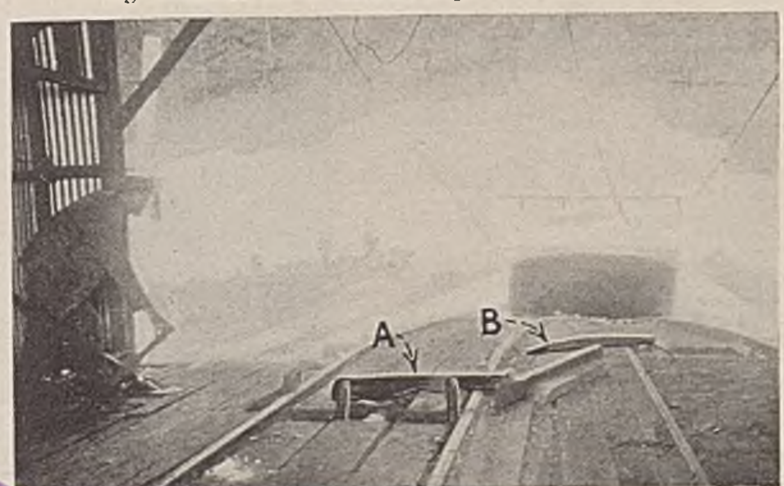
on the stem and against the head. Locknuts on the threaded end of the bolt hold the valve in place.

When the valve is in its lower position an opening is provided for the escape of air, since the hole is $\frac{1}{16}$ in. larger in diameter than the valve stem. With the drain end of the pipe open, the hydraulic pressure is relieved and the valve opens and admits air. This valve will also function to release air when an empty pipe is being filled. Mr. Watkins declares the valve also functions effectively in steam lines.

Movable Blocks Allow Rope To Shift Position

For letting a trip of empties down the slope into the Auxier (Ky.) mine of the North East Coal Co., a means has been provided at the knuckle to raise the rope over the horns and aid it in mov-

Fig. 1—Blocks Set to Conduct Rope to Normal Position



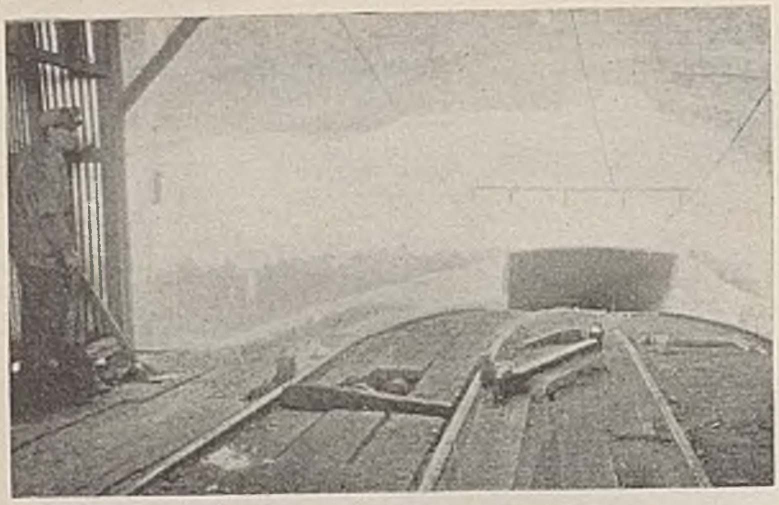


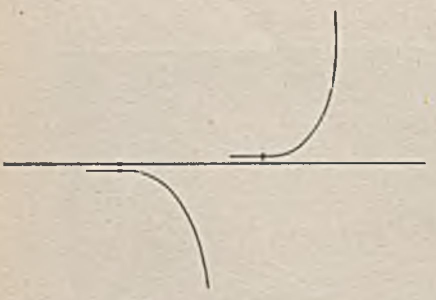
Fig. 2—Blocks Swung Back, Clearing Rails

ing over to normal position, onto the roller between rails of the loaded track. Fig. 1 indicates how this is done. Block *A* is raised to its position by a lever located beside another lever which operates the horns. Block *B* is pivoted on a vertical pin so that the wheel of a car being hoisted pushes the end of the block clear of the rail.

The coupler pushes block *B* in position with his foot when walking to his station at the levers. Fig. 2 shows the blocks in the positions clearing the rails. Block *A* is supported by two parallel arms which pivot at the bottom. As the block raises, it also moves sidewise, so that one end is above the rail and against a stationary block between tracks. The two slope tracks do not converge into one, but instead the four rails are laid with the track center lines about 6 in. apart.

Main Trolley Kept Free

New haulage units consisting of two 20-ton 250-volt locomotives operated in tandem in mines of the Consolidation Coal Co. have introduced difficulties of contacting the greater current from the trolley wire. Size 6/0 wire is being



Branch Trolleys Tied to Main With Feeder Clamps and Jumper

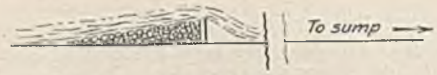
installed on roadways where the new locomotives operate and frogs are omitted where the 6/0 branch trolleys take off.

As indicated by the sketch, the end of the b.anch trolley parallels the main for a few feet, with proper spacing so as to in no way interfere with the free passage of the collector along the main. To date this construction has been tried only in Mine 120 (Acosta, Pa.), but, based on this installation it is planned to extend the practice to other mines.

The inconvenience to the motorman in handling the pole from one wire to the other when taking off the main or coming onto the main is but a small consideration.

Dam Above Drainage Sump Traps Débris

Drainage waters in mine ditches carry with them small pieces of coal and rock and also silt, which gather in the sump and must be cleaned out frequently, if pumping is to be most effective. Sump cleaning is not at all a pleasant task at best and whatever measures can be taken to avoid the necessity for it is well worth while.



Trap Dam in Drainage Ditch

G. E. Daugherty, safety engineer of the North East Coal Company, Paintsville, Ky., suggests the building of a low dam in the main ditch close to the sump. Débris will be trapped behind the dam and clear water will flow over it. Easy access to the trap encourages frequent cleaning out.

House-Coal-Bin Arrangement Avoids Confusion

To supply the town with house coal is more or less a problem at every mining plant. Though only a few tons of the feed into a tipple finds its way into the houses of the mining town, the very fact that this small tonnage must be diverted from and handled aside from the normal flow of coal to the plant is a vexing, even if small, factor. To interfere with normal preparation procedure by drawing off the normal flow to the house-coal bin is burden enough on the preparation operation. To have a truck loading station under the tipple and to provide a roadway to the tipple add unnecessary confusion to the traffic and activities about the plant.

At the Helvetia (Pa.) mine of the Helvetia Coal & Mining Co. house coal is transported from the tipple to a truck loading station by an electric larry, the idea being to keep the hauling trucks away from the tipple. The trucking loading station (see illustration) is nothing more than a chute on the rock dump which is enlarged into a covered pocket at the bottom. its storage capacity being about 30 tons. The larry is of the side-dump type with a capacity of 10 tons which also is used for removing ashes from the power house and rock from the tipple.

Keeping House Coal Trucks Away From Tipple

MARKETS IN REVIEW

+ Production Declines Sharply in 1930

Prices Slump in Last Half

REFLECTING the depressed condition of business in general, production of bituminous coal in 1930 slumped materially from the comparatively high level of 1929. U. S. Bureau of Mines estimates place the total output in 1930 at 461,630,000 net tons, a decline of 13.7 per cent from the 1929 figure of 534,989,000 tons. The 1930 production was the lowest since 1922, when 422,268,000 tons was mined.

Domestic consumption, estimated at between 70,000,000 and 80,000,000 tons annually, apparently decreased but little in 1930. The trend of stocks in the hands of commercial consumers was a favorable factor in 1930. Unprecedented reserves accumulated in 1927 were largely liquidated in 1928, and for the past two years have shown only the usual seasonal movements. Stocks on hand on Oct. 1, 1930, were 35,900,000 net tons, according to estimates by the U. S. Bureau of Mines, a decrease of 1,600,000 tons from the reserves on Oct. 1, 1929. Receipts at the Head of the Lakes and shipments to the New England territory and to foreign countries declined to only a nominal extent.

Electric utilities, railroads, steel plants, and general manufacturing establishments, however, materially reduced their takings, the total industrial consumption, after subtracting the domestic tonnage, apparently declining about 16 per cent in 1930. Lump coal was the most active of the domestic sizes in 1930, while egg, nut, and stove struggled along in the doldrums for the major part of the year. Because of the slack industrial situation, steam sizes, especially slack and screenings, were hard hit. The slow movement of these sizes forced drastic reductions in production in several fields in 1930.

While labor trouble was experienced in a number of districts, the total effect on production was only nominal. Usual seasonal fluctuations prevailed throughout the year, though the influence of weather on demand was more marked than usual. Inter-district competition gained in force, causing some shifts in tonnage as among producing fields. Buying was done largely on a hand-to-mouth basis, and the year proved disappointing to producers interested in contracts.

Spot prices for the country as a whole averaged $1.755 for the first six months of 1930, the same as for the first six months in 1929. In the third quarter, however, the average dropped to $1.71, against $1.77 for the third quarter of 1929. The average climbed in the last quarter to $1.79, though it was still 9c. lower than the 1929 figure of $1.88. The average for the year 1930 was $1.75, a decline of 2.2 per cent from the 1929 figure of $1.79.

Movement to the Lakes was, as in past years, one of the steadiest and most dependable factors in the trade in 1930, though total shipments failed to come up to the 1929 mark. Dumpings of cargo coal for the season ended Dec. 31 were 36,839,923 tons, a decrease of 1,093,326 tons from the 1929 total of 37,933,249 tons. Total dumpings of both cargo and fuel coal for 1930 were 38,160,476 tons, a decline of 1,223,366 tons from the 1929 figure of 39,383,842 tons.

Exports of anthracite and bituminous coal registered comparatively nominal declines in 1930. Total shipments of bituminous coal to foreign countries in 1930 were 14,176,256 gross tons, a decrease of 0.9 per cent from the 1929 total of 13,561,873 tons. Canada, as usual, was our biggest customer. Anthracite exports in 1930 were 2,278,262 gross tons, a decline of 2.5 per cent from the 1929 figure of 3,041,401 tons.

Anthracite, being primarily a domestic fuel, suffered less than bituminous coal in the year just past. The U. S. Bureau of Mines estimates the total production in 1929 at 69,802,000 net tons, a decrease of 5.5 per cent from the 1929 total of 73,828,000 tons. Weather conditions operated both for and against producers in 1930. The first four months of the year were unseasonably warm, with the result that production registered a major decline. The close of the year was more favorable, however, and the decrease in tonnage was comparatively small. Substitute fuels, hand-to-mouth buying, and disturbed credit conditions proved to be the chief stumbling blocks in the anthracite markets in 1930. Shipments to New

Average Spot Prices of Bituminous Coal, F.o.b. Mines

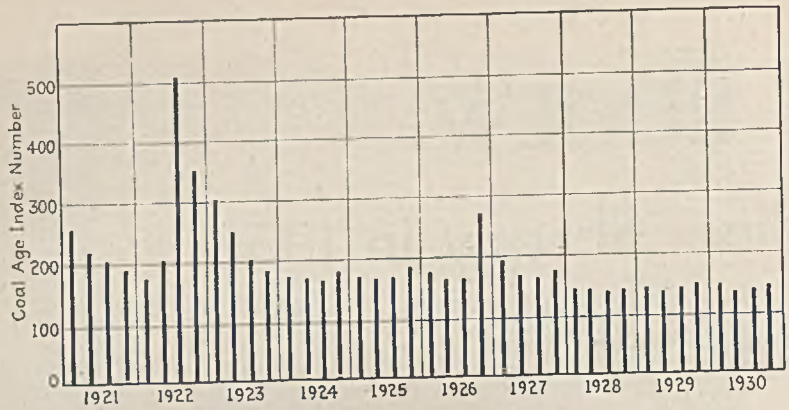
(Unit, net ton of 2,000 lb.)

Month	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
January....	$4.15	$2.48	$2.57	$2.57	$3.26	$2.25	$4.38	$2.21	$2.10	$2.18	$2.34	$1.85	$1.85	$1.88
February...	4.18	2.53	2.49	2.58	2.77	2.20	3.59	2.25	2.04	2.09	2.11	1.86	1.86	1.81
March.....	3.89	2.58	2.47	2.58	2.63	2.12	3.20	2.15	1.99	2.01	2.06	1.91	1.78	1.75
April......	3.21	2.64	2.43	3.85	2.62	2.24	2.84	2.07	1.95	1.92	1.93	1.74	1.69	1.71
May.......	4.14	2.67	2.38	4.59	2.68	3.11	2.68	2.04	1.97	1.93	1.87	1.73	1.68	1.68
June.......	4.00	2.57	2.40	7.18	2.52	3.32	2.56	2.03	1.95	1.90	1.85	1.73	1.67	1.68
July.......	3.17	2.58	2.47	8.24	2.40	4.67	2.40	1.98	1.93	1.91	1.87	1.71	1.70	1.70
August.....	3.24	2.58	2.76	9.51	2.42	6.13	2.39	1.99	2.04	2.00	2.06	1.74	1.77	1.68
September..	2.02	2.58	2.91	8.52	2.37	5.08	2.46	2.02	2.18	2.15	2.07	1.81	1.83	1.75
October....	2.02	2.58	3.09	7.78	2.33	4.48	2.28	2.10	2.13	2.70	1.96	1.83	1.90	1.80
November..	2.48	2.58	2.57	5.87	2.35	4.11	2.25	2.06	2.26	3.19	1.90	1.85	1.88	1.78
December..	2.48	2.58	2.58	4.38	2.26	4.05	2.18	2.06	2.19	2.53	1.90	1.85	1.87	1.78
1st Quarter.	$4.07	$2.53	$2.51	$2.58	$2.89	$2.19	$3.72	$2.20	$2.04	$2.09	$2.17	$1.87	$1.83	$1.83
2d Quarter.	3.78	2.63	2.40	5.20	2.61	2.64	2.69	2.04	1.96	1.92	1.88	1.73	1.68	1.68
3d Quarter.	2.81	2.58	2.71	8.76	2.40	5.46	2.42	2.00	2.05	2.02	2.00	1.75	1.77	1.71
4th Quarter.	2.33	2.58	2.74	6.01	2.31	4.21	2.23	2.07	2.19	2.81	1.92	1.84	1.88	1.79
Yearly aver.	$3.25	$2.58	$2.59	$5.64	$2.55	$3.67	$2.77	$2.08	$2.06	$2.21	$1.99	$1.80	$1.79	$1.75

Relative Prices of Bituminous Coal

(Spot prices July, 1913-June, 1914, as base)

Month	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
January....	343	205	213	212	270	186	362	183	173	180	190	152	153	155
February...	346	209	206	213	229	182	297	186	168	172	174	152	154	150
March.....	321	214	204	213	217	175	264	178	165	166	170	158	147	145
April......	265	218	200	318	217	185	235	171	161	159	159	144	140	141
May.......	342	221	197	379	222	257	221	169	162	159	155	143	139	139
June.......	331	212	198	593	208	274	212	167	161	157	153	143	138	139
July.......	262	213	204	681	198	386	198	163	160	158	154	141	140	140
August.....	268	213	228	786	200	507	198	164	166	165	170	144	146	139
September..	167	213	241	704	196	461	203	167	179	178	171	150	151	145
October....	167	213	256	643	193	370	188	174	176	223	162	152	157	149
November..	205	213	212	485	194	340	186	170	187	264	157	153	156	147
December..	205	213	213	362	187	335	180	170	181	209	157	151	154	147
1st Quarter.	337	209	208	213	239	181	307	182	169	173	178	153	151	150
2d Quarter..	313	217	198	430	216	218	222	169	162	158	156	143	139	139
3d Quarter	232	213	224	723	198	451	200	165	168	167	165	145	146	141
4th Quarter.	192	213	227	497	191	438	184	171	181	232	159	152	155	148
Yearly aver.	269	213	214	466	211	303	226	172	170	182	164	149	148	145



Relative Spot Prices of Bituminous Coal

In constructing the *Coal Age* Index Number of spot prices on bituminous coal the average for the year ended June, 1914, on fourteen coals representative of a large part of the annual output of the United States is taken as 100. Prices on these coals are weighted first with respect to the proportions of slack, mine-run, and prepared sizes shipped and second with respect to the tonnage each district produced.

England, Canada, and the Lakes, fell only slightly behind those of the preceding year. Continuance of stabilized labor relations was assured by the signing of a 5½-year wage agreement.

The year 1930 proved to be a disappointing one to the Chicago trade. The only exception to the general depression was in January, when cold weather kept demand alive and more active than at any other time during the year. From the beginning of February until the end of the year, both industrial and domestic buying lagged. Steam demand registered a more than ordinary decline in July, when steel

Bituminous Coal Output, Spot Prices, and Index, by Weeks, 1930

Week Ended	Production (Net Tons)	Average Spot Price	*Coal Age* Index
January 4	10,116,000	$1.89	155
January 11	11,166,000	1.90	156
January 18	10,667,000	1.89	155
January 25	11,703,000	1.88	155
February 1	11,628,000	1.82	150
February 8	10,936,000	1.85	153
February 15	10,224,000	1.82	150
February 22	9,515,000	1.81	150
March 1	8,179,000	1.78	147
March 8	8,565,000	1.78	147
March 15	8,077,000	1.81	150
March 22	7,832,000	1.77	146
March 29	8,911,000	1.65	136
April 5	8,248,000	1.71	141
April 12	8,257,000	1.71	141
April 19	8,103,000	1.72	142
April 26	8,191,000	1.69	140
May 3	8,335,000	1.70	140
May 10	8,285,000	1.68	139
May 17	8,169,000	1.65	136
May 24	8,272,000	1.68	139
May 31	7,590,000	1.68	139
June 7	8,151,000	1.66	137
June 14	7,986,000	1.68	139
June 21	7,998,000	1.69	140
June 28	7,995,000	1.67	138
July 5	6,545,000	1.71	141
July 12	7,861,000	1.70	140
July 19	7,922,000	1.72	142
July 26	8,084,000	1.71	141
August 2	7,991,000	1.68	139
August 9	7,839,000	1.65	136
August 16	8,171,000	1.69	140
August 23	8,494,000	1.70	140
August 30	9,053,000	1.69	140
September 6	8,088,000	1.72	142
September 13	9,145,000	1.73	143
September 20	8,920,000	1.78	147
September 27	9,103,000	1.78	147
October 4	9,304,000	1.79	148
October 11	9,495,000	1.80	149
October 18	9,230,000	1.79	148
October 25	10,453,000	1.86	154
November 1	10,145,000	1.78	147
November 8	9,708,000	1.78	147
November 15	9,718,000	1.77	146
November 22	8,890,000	1.78	147
November 29	8,705,000	1.79	148
December 6	9,607,000	1.77	146
December 13	8,784,000	1.76	145
December 20	9,355,000	1.78	147
December 27	6,892,000	1.80	149

mills and byproduct plants shut down on takings. Other industries soon after took similar steps, and forced the railroads in turn to curtail buying. Manufacturing plants began operating on reduced schedules early in the fall, with the result that screenings from the Middle Western mines and slack from Eastern fields were soft at a time when ordinarily they would be comparatively scarce and tight.

The most outstanding development in the market, aside from the prevalence of hand-to-mouth buying, was the four months' strike in western Kentucky, which, paradoxically enough, failed to affect buyers even to a limited extent. During the course of the trouble, which was ended late in the year, screenings sold quite frequently for the freight alone. But with the resumption of operations, this size advanced to about 15c., while domestic sizes went off 25c. Screenings from Illinois and Indiana mines also were weak, despite the fact that domestic production quite frequently was unusually low.

Summer buying was less than in any other recent year, and the situation carried over into the closing months of the year, in spite of the hopeful attitude of the trade with the passage of each inactive month. Smokeless coals and Eastern high-volatile varieties failed to rise above the low level established by the Middle Western types.

The St. Louis trade found it necessary to tighten its belt as the year 1930 progressed. Industrial demand was subnormal. Domestic sales held up comparatively well in the first half of the year, but warm weather in the last six months materially reduced household takings. The arrival of natural gas in December, 1929, plus a slight increase in the use of oil burners, further reduced the participation of the coal men in the heating market. Steam sizes sold at low levels all the year.

Mild weather and hand-to-mouth buying depressed the coal market at the Head of the Lakes to some extent in 1930. Receipts at the docks were somewhat behind the total for 1930, and shipments to the consuming territory also registered a decline. Demand was well distributed over all classes of coal, including slack. Few changes were recorded in the steady price levels.

Profits, if any, were few and far between in the Southwest market in 1930. Total production in Missouri, Kansas, Oklahoma, and Arkansas, reflecting the slow demand for coal and the serious inroads of oil, gas, and electricity, declined about 1,750,000 tons in 1930 to a final figure of slightly more than 11,00,000 tons. Quotations in December, 1930, showed few changes from those prevailing in December, 1929. List prices, however, failed to reflect the severe competition in the chief consuming cities. In November and December, when prices normally are high, numerous quotations under $1 were reported in Kansas City.

Mild weather and oil and gas competition in the Colorado market in 1930 resulted in a decrease of approximately 18 per cent in production, the total falling from 9,920,370 tons in 1929 to 8,196,100 tons in 1930. Prices on domestic lump, nut, and steam sizes were well maintained over the whole of the year, despite the slump in demand.

The coal industry in Utah in 1930 closely paralleled that of Colorado, mild weather and substitutes causing marked decreases in production. Storage activities were almost non-existent. Prices were well maintained in spite of the depression.

Coal and Coke Receipts at Duluth-Superior Docks, 1930, by Months*

(In Net Tons)

	Soft	Hard	Coke	Total
April	127,019	12,000	......	139,019
May	2,132,657	107,939	46,529	2,287,125
June	1,784,862	91,286	5,747	1,881,895
July	1,465,434	123,279	11,985	1,600,698
August	1,198,780	51,385	3,225	1,253,390
September	1,072,869	20,000	4,000	1,096,869
October	962,551	34,595	12,551	1,009,697
November	579,863	20,224	6,393	606,485
December	18,127	......	......	18,127
Totals	9,342,162	460,708	90,430	9,893,300

*U. S. Harbor Engineer's Office, Duluth, Minn.

Coal and Coke Receipts in Last Nine Years at Upper Lake Docks

(In Net Tons)

	Soft	Hard	Coke*	Total
1922	5,138,934	566,362	......	5,705,296
1923	11,268,337	1,419,984	......	12,688,321
1924	7,730,878	1,289,994	......	9,020,872
1925	8,882,569	790,132	......	9,672,701
1926	9,168,656	1,272,973	......	10,441,629
1927	11,452,444	981,194	......	12,433,638
1928	9,688,342	652,095	......	10,340,437
1929	10,330,445	401,249	75,282	10,806,976
1930	9,342,167	460,708	90,430	9,893,305

Average total shipments received during the past nine years, 10,111,464 net tons.

*Coke included in soft coal prior to 1929.

Coal Shipments in 1930 From Docks At Head of the Lakes*

	1930 Cars	1929 Cars	1928 Cars	1927 Cars	1926 Cars
Jan.	33,005	32,754	27,250	27,547	23,990
Feb.	19,861	31,390	22,804	21,091	19,219
March	15,228	15,562	18,518	14,646	14,836
April	11,454	12,327	14,135	13,218	11,855
May	14,019	18,105	14,717	15,117	11,808
June	12,380	14,926	12,279	14,495	12,659
July	13,290	13,553	12,585	13,267	16,223
Aug.	17,957	18,294	19,332	23,703	18,306
Sept.	18,603	22,252	25,003	25,794	27,590
Oct.	28,537	26,067	29,928	32,178	30,993
Nov.	22,354	29,428	27,492	30,109	35,531
Dec.	26,390	32,738	27,072	35,909	32,687
Totals	233,078	267,396	251,054	267,074	258,697

*Western Weighing & Inspection Bureau.

The year 1930 proved to be a trying one for the Louisville trade. General business depression and adverse freight rates were charged with the responsibility for the slow demand, while mild weather over most of the year curtailed domestic buying. Labor troubles in western Kentucky failed to have any great effect on the trade, though it put several mines out of business and depressed prices. Quotations were too low to be of any satisfaction to producers.

With the possible exception of the first three months, 1930 proved disappointing to the Cincinnati trade. The industrial situation played a major rôle in the depression, but hand-to-mouth buying was a disturbing factor of considerable moment. At times, the aggregate prices of the large sizes and the residue reached a respectable figure, but on occasions both went into the market at a loss. Two factors of note made their appearance in the market in 1930. The first was the excellent demand for premium and specialty coals, which sold at high levels throughout the years. The other was the disregard of egg, a popular size in other years.

Smokeless producers fixed the price of lump and egg at $3.50@$3.75 the first of the year, only to see the spot market fall to $1 before the end of January. Screenings sold up to $1.50@$1.60, but the demand was sufficient to hold these quotations up for the first two months of the year. High-volatile block and lump sold at $1.75@$2 at the first of the year, with slack at 75c.

June marked the low level in activity, while July passed without improvement. Only at the last of August were there signs of an upturn. Cold snaps in September sent smokeless lump and egg up to $4 and braced the high-volatile market. Gains made in September could not be held, however. Slack dropped steadily after October, selling at the end of the year at 25c., with occasional rallies in times of shortage to 75c. for the better grades. Lump was fairly firm, but egg failed at any time to attain any measure of activity. Mine-run was steady over the whole of the year.

The Columbus market experienced a fairly good year in 1930. Demand was good for the first few months, and the summer slump was not more marked than usual. Recovery was fair, though activity in the last three months was not as great as in preceding years. Smokeless coals and the premium grades of high-volatiles were most active, though prices in the fall failed to recover to the full extent expected. Production of Hocking, Pomeroy, and Cambridge coals was good, with fair prices.

The Cleveland market in 1930 was featured by hand-to-mouth buying and a tendency on the part of consumers to take the cheaper grades of coal, with a corresponding depressive effect on price levels. Slack was a drug on the market for the greater part of the year.

The year 1930 proved disappointing to the Pittsburgh trade. Slack industrial and railroad demand, coupled with the general business depression, curtailed the consuming market and caused a gradual settling in prices to lower levels. Domestic prices held up fairly well in 1930, and were somewhat stronger in the fall, as compared to 1929. Movement to the Lakes was normal. Steam slack was the only size exhibiting an erratic price movement. Quotations on this size drooped to the lowest level of the year at the beginning of fall, but recovered slightly late in the year.

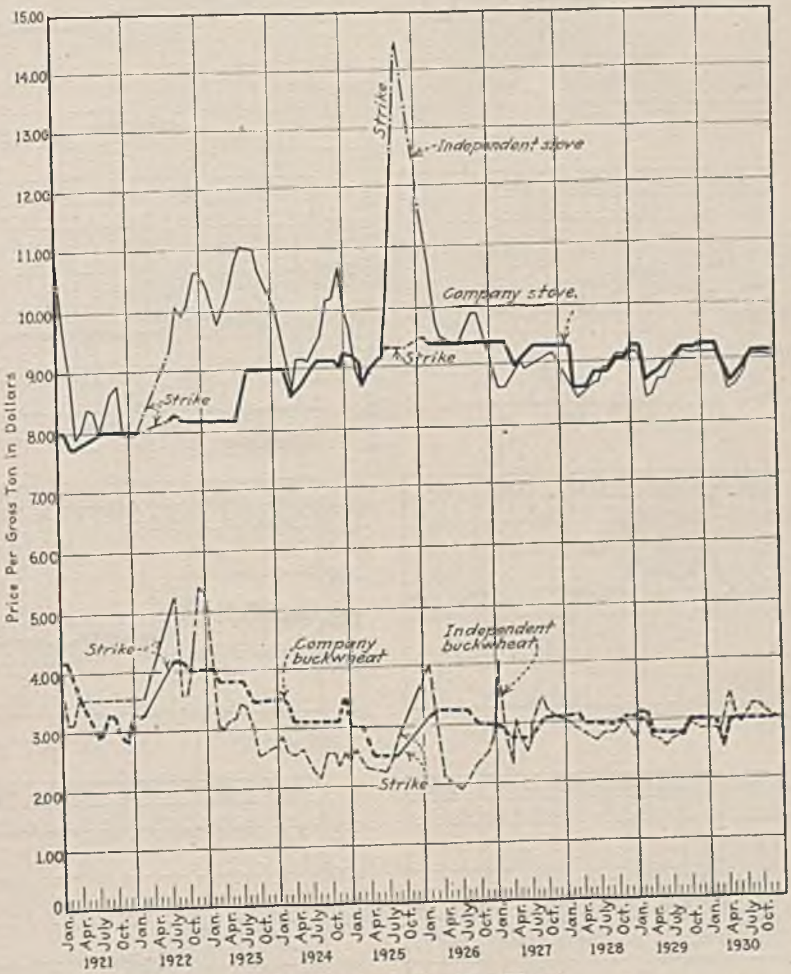
The central Pennsylvania trade enjoyed a fairly good year in 1930, chiefly

Average Monthly Quotations for Independent Anthracite In New York Market in 1930

	Egg	Stove	Chestnut	Pea	Buckwheat	Rice	Barley
January....	$8.40-$8.50	$9.10-$9.20	$8.65-$8.70	$4.75-$5.00	$2.70-$3.00	$1.70-$2.00	$1.40-$1.50
February..	8.40- 8.50	9.10- 9.20	8.65- 8.70	4.75- 5.00	2.70- 3.00	1.70- 2.00	1.40- 1.50
March.....	3.60- 8.70	9.10- 9.20	8.65- 8.70	4.75- 5.00	2.70- 3.00	1.70- 2.00	1.40- 1.50
April.......	3.45- 8.70	8.60- 9.20	8.10- 8.70	4.25- 5.00	3.25- 3.50	1.60- 2.00	1.25- 1.50
May.......	7.85- 8.10	8.35- 8.60	7.85- 8.10	4.25- 4.40	2.90- 3.25	1.50- 2.00	1.15- 1.50
June.......	8.00- 8.20	8.45- 8.70	7.95- 8.20	4.55	2.90- 3.00	1.60- 1.85	1.15- 1.50
July.......	8.35	8.60- 8.85	8.00- 8.35	4.70- 4.95	3.00- 3.25	2.00- 2.10	1.15- 1.40
August.....	8.35- 8.50	8.75- 9.00	8.00- 8.50	4.85	3.00- 3.50	1.65- 2.00	1.15- 1.50
September.	8.50- 8.65	9.00- 9.15	8.40- 8.65	4.75- 5.00	3.00- 3.50	1.70- 2.00	1.15- 1.50
October....	8.40- 8.65	9.00- 9.15	8.40- 8.65	4.75- 5.00	3.00- 3.25	1.65- 2.00	1.15- 1.40
November..	8.30- 8.65	9.00- 9.15	8.65	4.75- 5.00	3.00- 3.10	1.60- 1.90	1.15- 1.40
December..	8.25- 8.65	8.90- 9.15	8.65	5.00	3.00	1.60- 2.00	1.15- 1.40

Average Monthly Quotations for Company Anthracite In New York Market in 1930

	Broken	Egg	Stove	Chestnut	Pea	Buckwheat	Rice	Barley
January......	$8.20-$8.50	$8.70	$9.20	$8.70	$5.00	$3.00	$2.00	$1.50
February.....	8.20- 8.50	8.70	9.20	8.70	5.00	3.00	2.00	1.50
March.......	8.20- 8.50.	8.70	9.20	8.70	5.00	2.50	2.00	1.50
April.........	8.00- 8.50	8.10-8.70	8.60-9.20	8.10-8.70	4.40-5.00	3.00	2.00	1.50
May.	8.00	8.10	8.60	8.10	4.40	3.00	2.00	1.50
June.	8.15	8.20	8.70	8.20	4.55	3.00	2.00	1.50
July.........	8.30	8.35	8.85	8.35	4.70	3.00	2.00	1.50
August.......	8.25- 8.45	8.50	9.00	8.50	4.85	3.00	2.00	1.50
September....	8.50	8.65	9.15	8.65	5.00	3.00	2.00	1.50
October......	8.50	8.65	9.15	8.65	5.00	3.00	2.00	1.50
November....	8.50	8.65	9.15	8.65	5.00	3.00	2.00	1.50
December....	8.50	8.65	9.15	8.65	5.00	3.00	2.00	1.50

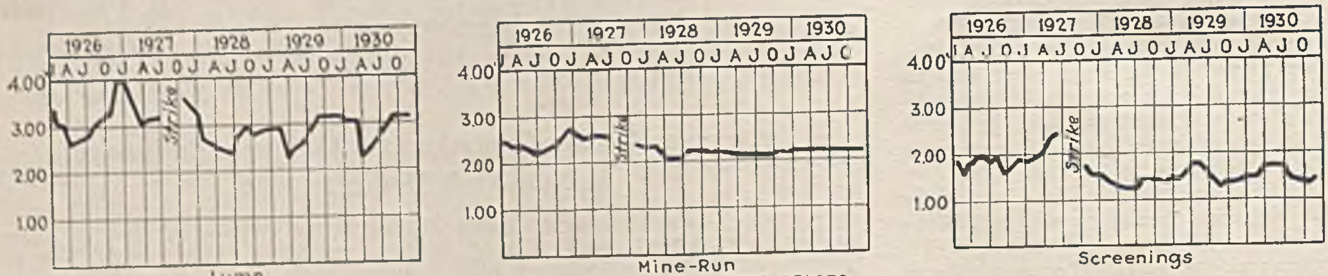


Anthracite Prices for Ten Years

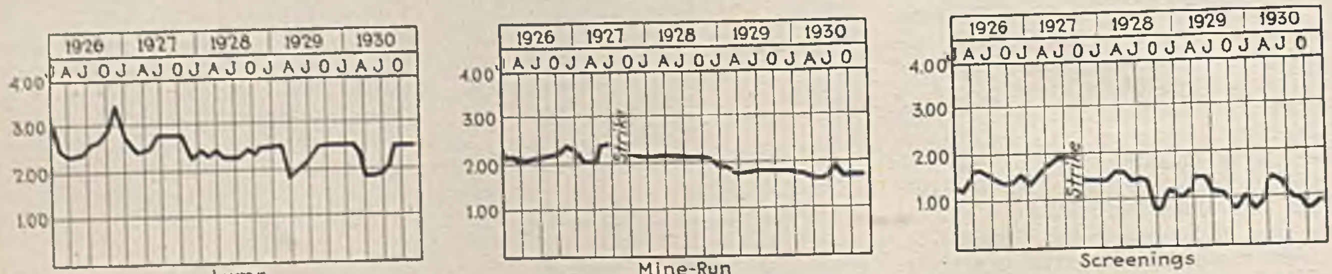
This diagram shows in dollars per gross ton the average company circular price and average spot quotations on "independent" stove and No. 1 buckwheat, f.o.b. mine basis, as quoted on the New York market.

Bituminous Spot Coal Price Trends 1926—1930

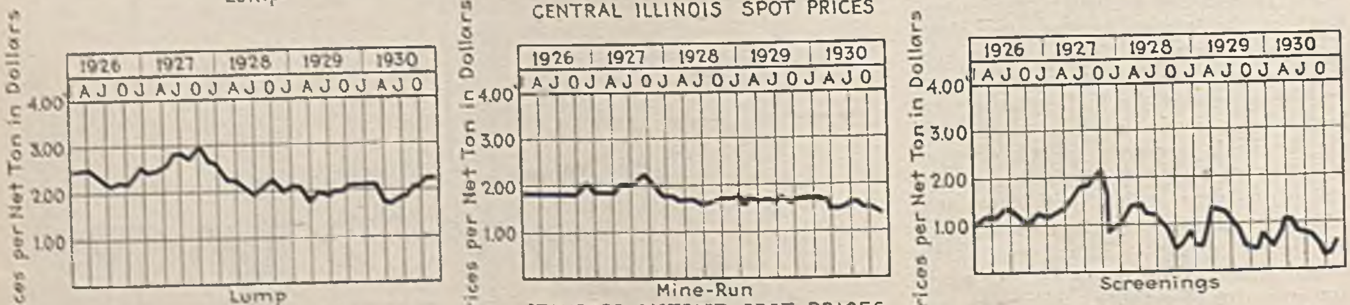
Graphs following show the trend of bituminous spot prices in representative producing districts during the last five years and are based upon the market data regularly collected and compiled by *Coal Age*.



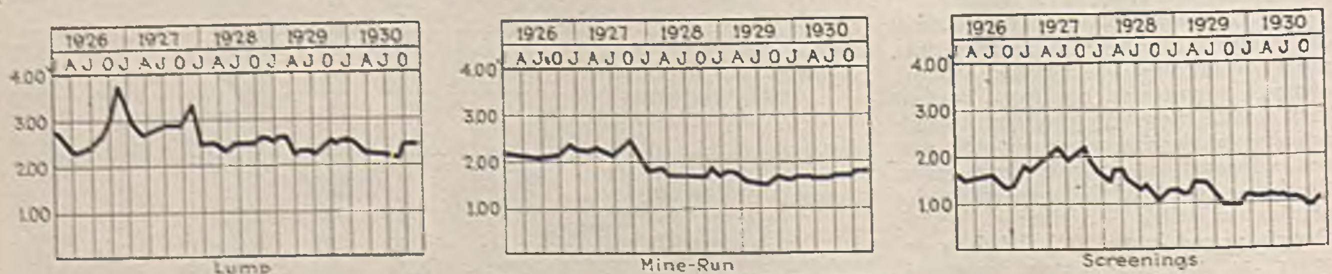
SOUTHERN ILLINOIS SPOT PRICES



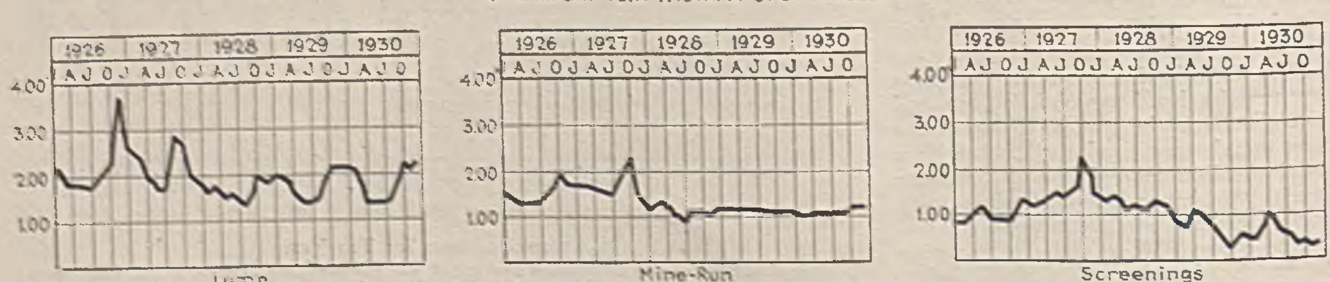
CENTRAL ILLINOIS SPOT PRICES



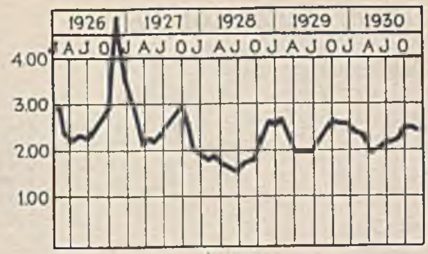
STANDARD DISTRICT SPOT PRICES



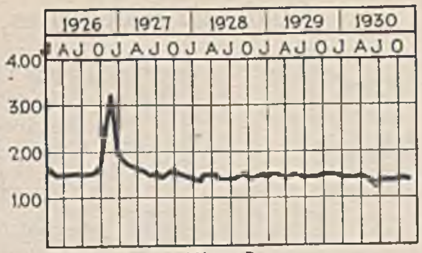
4th and 5th VEIN INDIANA SPOT PRICES



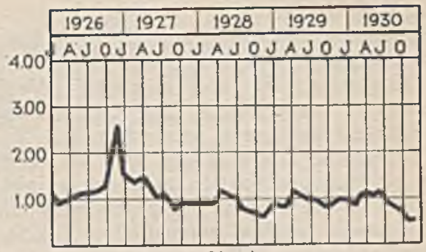
WESTERN KENTUCKY SPOT PRICES



Lump

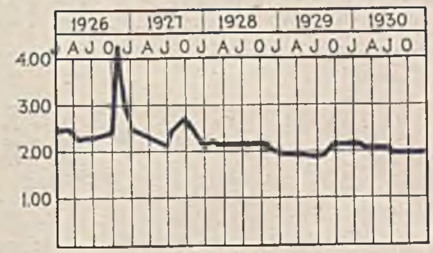


Mine-Run

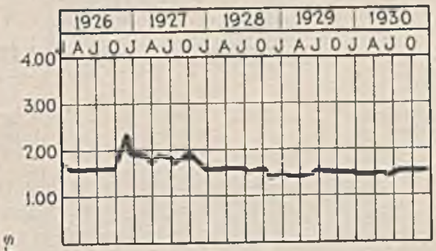


Slack

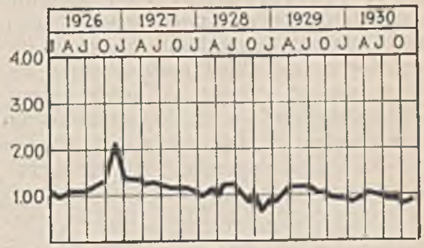
SOUTHEASTERN KENTUCKY SPOT PRICES



Lump

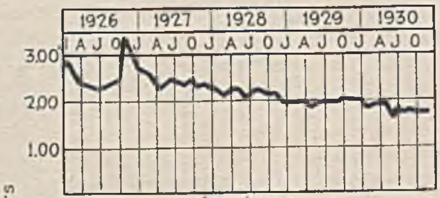


Mine-Run

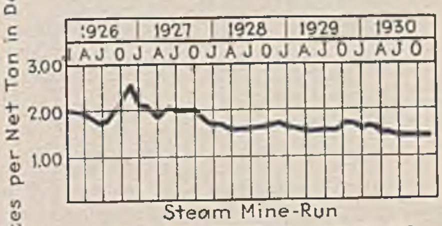


Slack

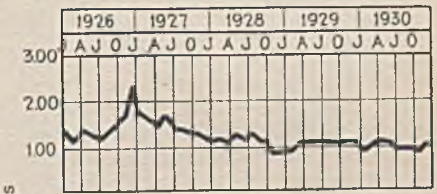
HOCKING DISTRICT SPOT PRICES



Gas Lump

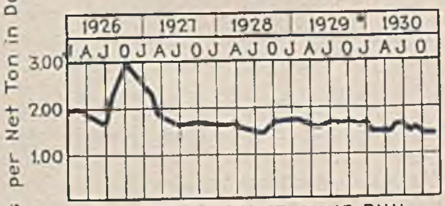


Steam Mine-Run

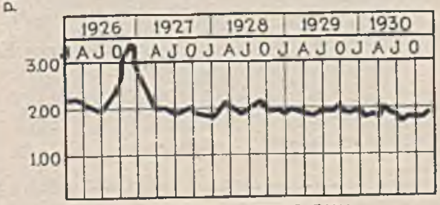


Gas Slack

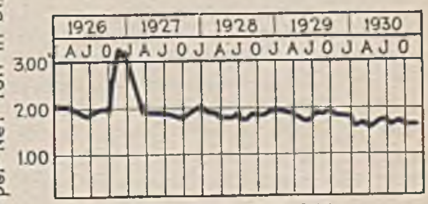
PITTSBURGH (WEST PA.) SPOT PRICES



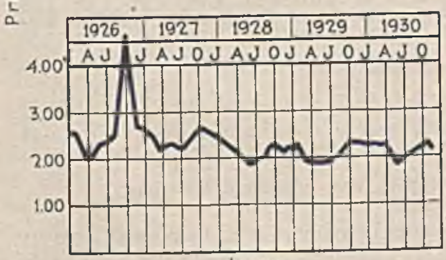
CLEARFIELD DISTRICT MINE-RUN



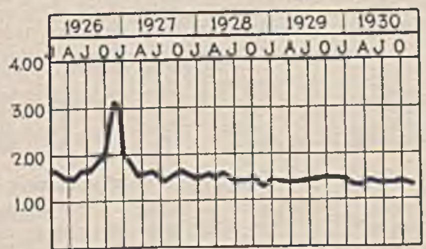
CAMBRIA MINE-RUN



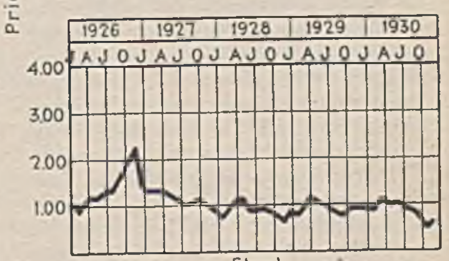
SOMERSET MINE-RUN



Lump

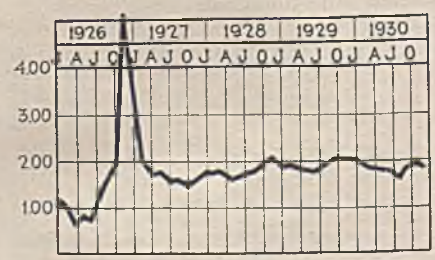


Mine-Run



Slack

KANAWHA DISTRICT SPOT PRICES



WEST VIRGINIA SMOKELESS MINE-RUN

General Market Conditions

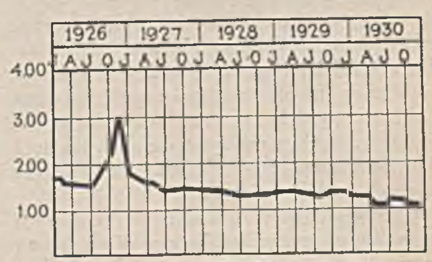
During 1930

Are Summarized

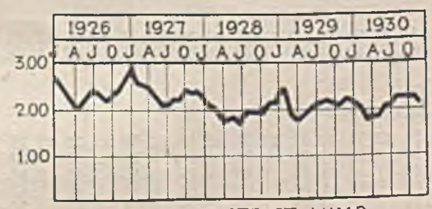
On Pages 103-108

Prices Tabulated by Months

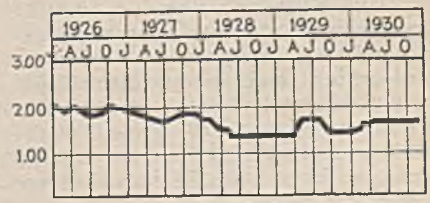
On Page 108



FAIRMONT DISTRICT MINE-RUN



ALABAMA DISTRICT LUMP



ALABAMA DISTRICT MINE-RUN

notable for the activity in domestic sizes. Production decreased slightly from that in 1929, and prices were held closely.

Conditions in the northern West Virginia market were characterized by a marked decrease in production in 1930. Part of the loss was due to a decrease in stocking and part to increased freight rates to the Lakes. The tendency of consumers to shop around also was an adverse factor. Prices were low, but unusually steady.

The situation in the New England market in 1930 was uneventful. Steam coal dragged throughout the year, except for a few short periods when demand almost caught up with output. Low quotations on smokeless mine-run were reached in May, when several sales under $4, f.o.b. vessels, Virginia terminals, were reported. Nut-and-slack hit bottom in August at $3.25. A live market for stoker coal held that size up in the summer, but it also fell under the blight of surplus production later in the year. Heavy losses to hydro-electric power continued, though steady gains in retail deliveries were reported. All-rail coals from central Pennsylvania showed slight gains here and there in response to calls for "lumpy domestic."

The decrease in consumption in 1930 was not so marked in New York as in other cities. Public-utility takings compared favorably with those in 1929. Perhaps the greatest decline was in sales to manufacturing plants. In general, consumption dwindled as the year wore on. Bunkering sustained further losses in 1930, largely because of lower prices at other ports. Quotations on lump and slack fluctuated considerably during the year, but changes in mine-run were small—all downward.

Reverses featured the Philadelphia trade in 1930, though the well-maintained consumption of electric utility plants was a favorable factor of note. Byproduct plants also took a fair share of the tonnage shipped to the market. Stocking continued to decrease, while contracting activities were disappointing. Prices were low, but marked fluctuations were absent.

Mild weather and rigid economy in use greatly curtailed sales of domestic coal in the Birmingham market in 1930. Substitute fuels also displaced a large tonnage. The industrial coal market was quiet and sluggish and was distinguished by a drop in railroad takings and growth of hand-to-mouth buying. Coking operations were materially reduced. Bunkering was quiet. Hydro-electric power, fuel oil, and natural gas were disturbing elements.

Warm weather in the first quarter of the year, economy in the use of fuel, and encroachments of substitute fuels narrowed the sale of anthracite in the New York and Philadelphia markets in 1930. Aggressive competition among wholesale and retail interests, with attendant price-cutting and credit disturbance, was an additional adverse factor. A feature of the year was the growth of the trend from the larger to the smaller sizes, due in part to the increased use of domestic stokers.

Coal Age Spot Prices, F. O. B. Mines, for 1930

Southern Illinois (Franklin County) Coals

CHICAGO MARKET

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
Lump	$3.15	$3.15	$2.93	$2.25	$2.40	$2.55	$2.76	$3.00	$3.25	$3.25	$3.25	$3.25
Mine run	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15	2.15
Screenings	1.45	1.45	1.45	1.70	1.73	1.73	1.73	1.48	1.40	1.38	1.33	1.40
Weighted av.—all sizes	2.50	2.50	2.39	2.11	2.19	2.26	2.37	2.44	2.54	2.54	2.53	2.53

Central Illinois Coals

CHICAGO MARKET

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
Lump	$2.53	$2.53	$2.35	$1.83	$1.83	$1.83	$1.88	$2.08	$2.53	$2.53	$2.53	$2.53
Mine run	1.78	1.78	1.75	1.68	1.68	1.68	1.73	1.93	1.70	1.70	1.70	1.70
Screenings	0.98	0.77	0.93	1.38	1.43	1.36	1.13	0.95	0.89	0.73	0.76	0.91
Weighted av.—all sizes	1.99	1.97	1.90	1.70	1.71	1.70	1.69	1.83	1.95	1.92	1.93	1.95

Standard District Coals

ST. LOUIS MARKET

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
Lump	$2.13	$2.16	$2.12	$1.75	$1.70	$1.73	$1.81	$1.83	$2.08	$2.11	$2.25	$2.25
Mine run	1.70	1.70	1.65	1.50	1.50	1.55	1.63	1.63	1.50	1.50	1.48	1.43
Screenings	0.66	0.50	0.85	1.26	1.20	0.85	0.79	0.76	0.53	0.34	0.36	0.60
Weighted av.—all sizes	1.72	1.71	1.74	1.58	1.54	1.50	1.56	1.57	1.61	1.59	1.64	1.68

Mt. Olive District Coals

ST. LOUIS MARKET

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
Lump	$2.33	$2.45	$2.20	$1.88	$1.88	$2.00	$1.99	$2.08	$2.25	$2.30	$2.50	$2.50
Mine run	1.75	1.75	1.72	1.65	1.65	1.65	1.81	1.88	1.65	1.67	1.73	1.73
Screenings	0.95	0.79	1.20	1.40	1.30	0.95	0.99	0.90	0.82	0.50	0.42	0.73
Weighted av.—all sizes	1.89	1.92	1.85	1.71	1.69	1.69	1.75	1.80	1.79	1.74	1.86	1.92

Indiana Fourth and Fifth Vein Coals

CHICAGO MARKET

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
Lump	$2.53	$2.50	$2.30	$2.28	$2.28	$2.21	$2.21	$2.19	$2.19	$2.44	$2.44	$2.44
Mine-run	1.65	1.64	1.65	1.64	1.64	1.64	1.65	1.66	1.66	1.71	1.75	1.75
Screenings	1.21	1.14	1.17	1.21	1.15	1.19	1.12	1.10	1.03	0.95	0.96	1.12
Weighted av.—all sizes	1.91	1.89	1.81	1.82	1.82	1.76	1.77	1.76	1.75	1.85	1.87	1.91

Western Kentucky Coals

AVERAGE OF QUOTATIONS ON CHICAGO AND LOUISVILLE MARKETS

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
Lump	$2.13	$2.07	$1.75	$1.38	$1.35	$1.38	$1.41	$1.47	$1.97	$2.25	$2.13	$2.25
Mine-run	1.08	1.00	1.00	1.06	1.09	1.08	1.07	1.08	1.05	1.17	1.21	1.21
Screenings	0.50	0.50	0.78	1.01	0.93	0.70	0.62	0.56	0.36	0.41	0.30	0.36
Weighted av.—all sizes	1.33	1.28	1.22	1.17	1.15	1.12	1.13	1.13	1.24	1.41	1.36	1.41

Southeastern Kentucky Coals

AVERAGE OF QUOTATIONS ON CINCINNATI, CHICAGO, AND LOUISVILLE MARKETS

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
Lump	$2.50	$2.42	$2.35	$2.17	$1.98	$2.06	$2.17	$2.21	$2.27	$2.50	$2.50	$2.42
Mine-run	1.47	1.43	1.41	1.45	1.42	1.36	1.40	1.40	1.41	1.41	1.43	1.39
Slack	1.07	0.83	1.07	1.11	1.05	1.12	1.02	0.83	0.74	0.67	0.52	0.56
Weighted av.—all sizes	2.01	1.95	1.92	1.83	1.70	1.75	1.80	1.80	1.76	1.94	1.92	1.87

Hocking District (Ohio) Coals

COLUMBUS MARKET

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
Lump	$2.13	$2.12	$2.08	$2.08	$2.08	$2.08	$2.05	$1.95	$1.95	$1.95	$1.95	$1.95
Mine-run	1.48	1.48	1.48	1.48	1.53	1.48	1.51	1.53	1.53	1.53	1.53	1.53
Slack	0.90	0.83	0.92	0.97	1.03	1.00	0.95	0.91	0.87	0.81	0.81	0.84
Weighted av.—all sizes	1.66	1.64	1.65	1.66	1.70	1.66	1.66	1.62	1.60	1.60	1.60	1.59

Pittsburgh District (Western Pennsylvania) Coals

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
Lump	$1.95	$1.84	$1.88	$1.88	$1.88	$1.65	$1.83	$1.76	$1.78	$1.75	$1.75	$1.75
Mine-run	1.59	1.65	1.63	1.53	1.53	1.48	1.45	1.45	1.45	1.45	1.45	1.45
Slack	0.99	0.93	1.05	1.16	1.13	1.07	0.98	0.98	0.98	0.95	0.90	1.08
Weighted av.—all sizes	1.57	1.55	1.56	1.55	1.54	1.44	1.43	1.44	1.43	1.42	1.41	1.45

Mine-Run Coals From Cambria, Somerset, and Clearfield Districts

BOSTON MARKET

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
Clearfield	$1.70	$1.54	$1.50	$1.49	$1.50	$1.63	$1.65	$1.55	$1.59	$1.49	$1.47	$1.43
Cambria	1.93	1.82	1.83	1.79	2.00	1.88	1.85	1.73	1.81	1.81	1.82	1.88
Somerset	1.79	1.63	1.65	1.61	1.68	1.73	1.75	1.65	1.68	1.66	1.64	1.63

Southern West Virginia Smokeless Mine-Run Coals

VARIOUS MARKETS

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
Columbus	$2.15	$2.00	$1.88	$1.88	$1.88	$1.88	$1.88	$1.88	$1.88	$2.10	$2.00	$1.88
Chicago	2.13	2.07	2.00	1.96	1.85	1.92	1.88	1.88	1.97	2.00	2.00	2.00
Cincinnati	2.10	2.01	2.00	1.93	1.90	1.92	1.88	1.89	2.01	2.07	2.09	2.00
Boston	1.81	1.60	1.48	1.44	1.39	1.30	1.37	1.37	1.39	1.46	1.51	1.56
Average—all markets	2.05	1.93	1.84	1.81	1.76	1.74	1.75	1.75	1.82	1.91	1.90	1.86

Southern West Virginia High-Volatile Coals

AVERAGE OF QUOTATIONS ON COLUMBUS AND CINCINNATI MARKETS

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
Lump	$2.24	$2.18	$2.10	$2.18	$2.08	$1.85	$2.00	$2.06	$2.18	$2.21	$2.27	$2.14
Mine-run	1.42	1.36	1.33	1.39	1.42	1.37	1.39	1.40	1.40	1.42	1.38	1.36
Slack	0.88	0.85	1.06	1.06	0.98	1.04	0.96	0.84	0.80	0.61	0.49	0.58
Weighted av.—all sizes	2.24	2.18	2.10	2.18	2.07	1.85	1.99	2.06	2.18	2.23	2.27	2.14

Big Seam (Alabama) Coals

BIRMINGHAM MARKET

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
Lump	$2.13	$2.05	$1.75	$1.85	$1.85	$2.05	$2.09	$2.25	$2.25	$2.25	$2.25	$2.13
Mine-run	1.43	1.48	1.68	1.63	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68

Eastern Coals

NEW YORK MARKET

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
Pool 1 (Navy Standard)	$2.40	$2.36	$2.25	$2.28	$2.38	$2.38	$2.38	$2.38	$2.38	$2.38	$2.28	$2.25
Pool 9 (super low-vol.)	2.08	2.08	2.08	1.93	1.98	1.98	1.98	1.98	1.95	1.88	1.88	1.88
Pool 10 (h. gr. low-vol.)	1.80	1.80	1.80	1.85	1.88	1.88	1.88	1.78	1.75	1.68	1.68	1.68
Pool 11 (low-vol.)	1.68	1.68	1.68	1.68	1.68	1.63	1.63	1.63	1.63	1.53	1.46	1.45
Pool 54-64 (gas and st.)	1.26	1.20	1.20	1.23	1.13	1.18	1.15	1.09	1.10	1.08	1.05	1.05

WORD from the FIELD

Swayne Heads Burns Bros.

Noah H. Swayne, 2d, executive director of the Anthracite Institute since April, 1930, has been elected president of Burns Bros., New York City, vice Sanders A. Wertheim, who resigned because of illness. Mr. Swayne was formerly a New York lawyer, adviser to the U. S. Fuel Administrator during the war, president of the American Wholesale Coal Association, administrator of the Philadelphia Retail Coal Conference, and president of the Coal Club of Philadelphia.

Charles A. Connell, general manager of the Anthracite Coal Service, was chosen to succeed Mr. Swayne as executive director of the Anthracite Institute. Mr. Connell went with the service organization seven years ago, and was made general manager in May, 1929. Before that time he was engaged in sales work on power-plant equipment and at one time represented an industrial oil burner.

Noah H. Swayne, 2d

Smoke Ordinance Adopted

The Hudson County (N. J.) Board of Health and Vital Statistics, on Jan. 22, adopted a smoke ordinance prohibiting the making of dense smoke within the limits of the county and setting up a Department of Smoke Regulation. Dense smoke is defined by the ordinance as being equivalent to No. 3 or greater on the Ringelmann chart, or as being so thick at the point of emission that it cannot be seen through.

The ordinance also prohibits the emission of dense smoke, fly-ash, or fumes from any smokestack or open fire, except that from a locomotive or steamboat, for a period or periods aggregating two minutes in any period of fifteen minutes. It also prohibits smoke equivalent to No. 2 (of a density such that it can be dimly seen through) for a period or periods aggregating twelve minutes in any period of one hour. Locomotives or steamboats are prohibited from emitting a No. 3 smoke for a period or periods aggregating 30 seconds in any period of three minutes, or a No. 2 smoke for a period or periods aggregating four minutes in any period of fifteen minutes.

Councillor Plan Developed To Help Retailer

To maintain closer contact with retail coal dealers and to help them by supplying important and practical information, the National Retail Coal Merchants' Association, under the direction of Harry Turner, Topeka, Kan., has developed the "national councillor" plan of procedure. In brief, the plan provides for the election of a representative coal man in each city of over 5,000 population, who will act as a contact man between the retailers and the national association. Councillors are appointed for one year, and will supply merchants with facts and information developed by the association; offer aid in directing advertising; assist local dealer associations; and keep the national group informed of conditions and assistance desired.

Altoona Properties Sold

Several thousand acres of coal land seven miles west of Altoona, Pa., and the mining properties of the Altoona Coal & Coke Co. were purchased by Thomas L. Jones, of Altoona, last month for $22,000 at a sheriff's sale. The new owner announced that operation of the mines would be resumed.

Buying Code Approved

Final approval of a code of ethics to govern the buying and selling of bituminous coal was given at a joint meeting of the trade relations section of the Market Research Institute of the National Coal Association with representatives of the National Association of Purchasing Agents, the National Retail Coal Merchants' Association, and the International Railway Fuel Association, held at New York City, Jan. 29.

The meeting also decided to questionnaire the membership of the National Coal Association with respect to the use of the standard coal contract and to submit a brief to the purchasing agents on the advantages of contract buying. It was the sense of the meeting that railway purchasing agents should be asked to furnish data on trends in railroad buying of prepared sizes. "Close buying" and "loose selling" furnished material for general debate.

G. A. Renard, secretary-treasurer of the National Association of Purchasing Agents, urged coal operators to get behind a movement to revise federal and state statutes relating to purchasing of supplies. Almost invariably the law reads that the contract shall be awarded to "the lowest responsible bidder." The N.A.P.A. recommends a revision to "the lowest and best bidder," the latter wording taking into account the following satisfactory elements involved in a purchase, in this order of importance: suitability of material, availability of material, creditability of seller, and price.

There was considerable discussion as to standardization of sizes and terminology of coal. Further effort will be made by the National Coal Association to compile data along this line, designed to give a complete picture of the number of sizes in every field and the reasons advanced by the operators for their production. The representatives of both the purchasing agents and the retailers' organizations professed deep interest in that subject.

Charles A. Owen, president of the Imperial Coal Corporation and chairman of the trades relations section, headed the National Coal Association group. Other members of the section attending were: T. J. O'Brien, general sales manager, Gunn-Quealy Coal Co.; J. P. Bradin, general sales manager, Pennsylvania Coal & Coke Corporation; and C. H. Jenkins, vice-president, Hutchinson Coal Co. Mr. Renard and T. W. Harris, Jr., chairman of the fuel committee, represented the purchasing agents. J. E. Davenport, assistant general superintendent, New York Central R.R., was the spokesman for the railway association. M. E. Robinson, Jr., president, and Joseph E. O'Toole, executive vice-president, National Retail Coal Merchants' Association, represented that division of the coal industry.

Bill for Mines Laboratory Favorably Reported

The U. S. Senate Committee on Mines and Mining has reported favorably the Tydings-Goldsborough bill, authorizing the erection of a $350,000 laboratory for the U. S. Bureau of Mines on a 20-acre tract on the campus of the University of Maryland. This station would be less than seven miles from the Washington headquarters of the Bureau and, as stated by Scott Turner, director of the Bureau, in correspondence printed in the committee's report, would enable the technical divisions to carry forward their scientific as well as administrative work with less difficulty than at present, when all the laboratories of the Bureau are located at various field stations because of crowded conditions in Washington. The campus tract would be donated to the government.

Research Fund Asked

Members of the Engineering Council of Utah, at a meeting Jan. 13 in Salt Lake City, Utah, voted to request the Chamber of Commerce to support a plea for a state appropriation of $10,000 to be used in research work on Utah coal. The appropriation would be matched by $10,000 for which Senator Smoot seeks Congressional approval, and the fund used in studying methods for processing coal; determining markets for byproducts; and for developing smokeless combustion.

British and German Miners Settle Strikes

After failure of several conferences between South Wales mine owners and striking miners to clear up differences on wages and hours of work under the British Coal Mines Act, an agreement was reached Jan. 15 at a meeting in London. On Jan. 16, local unions in the South Wales coal field ratified the pact, which goes into effect for three years, and continues thereafter except on one month's notice by either party to the agreement. Ratification enabled 140,000 miners, idle since Jan. 1, to return to work in South Wales.

Under the terms of the agreement, the men return to work at the rates of pay ruling in November, 1930 (which means no reduction), and the hours per day were established at 7½. However, upon the insistence of the owners, the agreement provided for a joint conciliation board to determine what the percentage of reduction would be, and also to determine the subsistence wage to be paid. The conciliation board was to give its decision before Feb. 28, to become effective March 1. Either party to the agreement has the right to apply for a review of the minimum percentage and the subsistence wage.

In the Ruhr coal field of Germany, the official arbitrator, as the result of a strike last month against wholesale discharges and wage cuts, reduced the wages of all classes of workers 6 per cent on Jan. 10. The decision is binding until June 30, 1931, and revoked the discharges of employees scheduled for Jan. 15. Workers had asked for a 4 per cent reduction, while owners insisted upon a cut of 8 per cent.

Business Improvement Slow

"Improvement [in business] is painfully slow," says *The Business Week* of Feb. 4. "This is disappointing," it continues, "to those looking for miracles, without understanding how they are produced; but in the longer view the absence this year of a swift rebound from the December bottom is encouraging in a left-handed way. Our index has dropped a little this week, but still moves on a level a few points above December. The rise in steel activity is slowing down, but merchandise car loadings suggest increasing movement of finished goods to depleted inventories. Building, coal, and power production continue to resist further decline. Only money turnover, as reflected in bank debits and currency in circulation, has dropped a bit, and the latter has its favorable side, indicating public confidence in banks.

"More rapid improvement, under existing conditions, would be phoney. Nothing that could be done to hasten it has been done or is being done anywhere. The deflationists are now dominant in every aspect of public and private policy. Federal Reserve credit is being steadily contracted; the cost of long-term capital remains high; the bond market is still highly uncertain; uneconomic gold movements continue; the liquidation process goes on; commodity prices still drift downward; the domestic political outlook grows worse. Under such conditions, improvement depends solely upon increase of consumer replacement demand, and is bound to be slow, because it's largely up to the stork—a slow bird."

Advertising and Co-Operation Urged to Sell Coal

Evolution of co-operative ideas for the promotion of the coal trade by publicity was the theme of the meeting of the publicity section of the Market Research Institute of the National Coal Association, held in Chicago, Jan. 14. Grant Stauffer, president, Sinclair Coal Co., Kansas City, Mo., and chairman of the section, in opening the meeting, stated that advertising was one way of putting the coal industry back on its feet. "Merchandising," he explained, consists in "getting behind automatic stokers or whatever will make for the burning of coal more conveniently." He stated that it was his opinion that the coal industry would make big strides in giving its customers improved service and a better product.

Promotion of the use of stokers offers the best means of holding old customers and winning new ones, the general discussion brought out. Closer co-operation with the retailers was urged, as they can do more than any other group in pushing the sales of stokers. While the group was of the opinion that a separate organization should be provided for selling stokers, it decided that a broad field existed for the co-operation of the retailers in advancing the burning of coal automatically. Attention was called to the fact that coal operators spend little money for advertising, as against thousands of dollars for modern machinery. Producers, the discussion brought out, should insist on advertising that gives real information, rather than the trade name of the coal.

The meeting advocated the organization of a speakers' program, whereby operators would be available for addresses before civic groups, clubs, and other public gatherings in an effort to acquaint the public with the latest developments in the automatic burning of coal and with the modern preparation of coal.

New River Operators Ask Research School

Appropriation of state funds to establish a graduate school of research at the University of West Virginia was asked in a resolution addressed to the West Virginia Legislature and adopted by the New River and Winding Gulf Mining Institute at its tenth annual banquet, which was held at Mt. Hope, W. Va., Jan. 24. P. M. Snyder, president, C. C. B. Smokeless Coal Co., was toastmaster. Addresses were made by Dr. Turner, president; C. E. Lawall, head of the school of mines; and Dr. Burke, research director, University of West Virginia; J. T. Ryan, vice-president, Mines Safety Appliances Co.; Ellsworth H. Shriver, superintendent, Nellis mine, American Rolling Mill Co.; Robert M. Lambie, chief, State Department of Mines, West Virginia; and Robert Lilly, president of the institute. Over five hundred coal men attended the meeting.

Mineral Development Planned In Illinois

Synthetic natural gas, oil, and gasoline from Illinois coal are possibilities in a program of development sponsored by representatives on the state mineral industries. These representatives, together with others from engineering and business organizations, have formed a mineral industries committee to develop a program of research and public service adequate for the needs of the state. Some of the projects considered include: thorough field studies, laboratories for research into the fundamental constitution of earth minerals and their utilization, study of the movement of these products into and out of the state, development of new uses, and the preparation and maintenance of a collection of raw materials and manufactured products for the use of scientific and technical staffs of corporations, engineers, executives, and educational institutions.

Natural Gas Sales Decline In November

Sales of natural gas in November, 1930, totaled 29,585,612,000 cu.ft., a decline of 11 per cent from the figure in November, 1929. The decrease was influenced by the marked drop in industrial consumption, according to the American Gas Association. Industrial sales for the country as a whole dropped from 17,149,954,000 cu.ft. in November, 1929, to 13,308,392,000 cu.ft. in November, 1930, a decrease of 22 per cent. On the other hand, the Appalachian Gas Corporation, Memphis Natural Gas Co., and Southern Natural Gas Corporation, operating largely in the Southern states, reported material increases in total sales.

Activities for the extension of natural gas distribution continued unabated in January. The Birmingham Gas Co. announced plans for an expansion in its distribution in the Birmingham (Ala.) district, while the Columbia Gas & Electric Co. started a survey in Virginia as a preliminary to establishing distributions systems in that state. In the anthracite region, a new company was chartered to supply gas to the Schuylkill region. The Memphis company also evidenced its intention of taking in several west Tennessee towns in 1931.

A partial list of new gas lines, excluding the Pacific coast, reported in January, is as follows: completed—United Pipe Line Corporation, Refugio-Pettus-Kennedy line, Texas, consisting of 16- and 18-in. pipe, and Boggy Creek-Huntsville line, Texas, 6-in. pipe; projected—Kentucky Natural Gas Co. line from Russellville, Ky., to Nashville, Tenn.; Colorado Natural Gas Co., line from the Hugoton field in Kansas to Canon City, Colo.; Jerome L. Drumheller, line across the State of Idaho to extend eventually to Spokane, Wash.; Wasatch Gas Co., line from Ogden, Utah, to Pocatello, Idaho, serving Box Elder and Cache counties, Utah.

Packaged for Convenience

C. F. & I. Offers Boxed Coal

Packaged nut coal is now being offered through the retail trade in Western territory by the Colorado Fuel & Iron Co., which is marketing the product under the trade name "Karikol." At present nut coal from the Walsenburg, Canon City, and Crested Butte fields is available in packaged form. Each box contains 60 lb. of coal and the company has suggested to the retailers that these be sold to the consumer at 59 or 69c. per box.

The container, sturdily constructed of heavy corrugated fiber board, measures 18x11x11 in. The name of the coal, trademark, and descriptive matter are printed on all four sides of the box in red and black. The container has the patented "scuttle box" opening, also featured in the packages put out by the McAlester-Edwards Coal Co, last year (*Coal Age*, Vol. 35, p. 504).

Coal Scale Tolerance Reduced

A reduction in the present 1 per cent, minimum 500 lb., scale tolerance on reweighed shipments of coal to 0.5 per cent, minimum 500 lb., has been ordered by the Interstate Commerce Commission in the case of the Corn Belt Merchants' Association. The reduction takes effect not later than April 22, the present tariff rules being found to be unreasonable.

Big Vein Company Sold

The coal mine and equipment of the Big Vein Anthracite Corporation, McCoy, Va., was sold at public auction last month by the Farmers & Merchants National Bank, Radford, Va., as trustee. Col. Robert N. Harper, Washington, D. C., purchased the property for $250,000.

Panhandle Institute Elects

E. S. Wade, superintendent, Windsor Power House Coal Co., Windsor Heights, W. Va., was chosen president of the Panhandle Coal Mining Institute for the eleventh time at the annual election on Jan. 21. Fred McConnell, Wellsburg, W. Va., was re-elected secretary-treasurer. Six vice-presidents were chosen, as follows: Charles Aitkens, general superintendent, Constanzo Coal Mining Co., Wheeling, W. Va.; George Caldwell, general manager, Pittsburgh Wheeling Coal Co., Wheeling; A. B. Pryor, general superintendent, Elm Grove Mining Co., Elm Grove, W. Va.; Arthur Johns, Windsor company, Windsor Heights; J. L. Ernest, Wheeling Steel Corporation, Wheeling; and Dick Ryan, engineer, Wheeling. At the technical session, papers on roof control, safety and mechanization were read.

Mather Holds Safety Banquet

To celebrate the passage of 1930 without a fatal accident or permanent injury to any employee, 30 officials of the Mather Collieries mine of Pickands, Mather & Co., Mather, Pa., held a banquet at the Fort Jackson Hotel, Waynesburg, Pa., Jan. 2. Addresses were made by Judge H. A. Sayers; John V. McKenna, mine inspector, thirteenth bituminous district of Pennsylvania; Harvey J. Nelms, general superintendent, Crucible Fuel Co.; and F. B. Dunbar, general superintendent, and C. A. Bower, superintendent, Pickands, Mather & Co.

Central in Receivership

The Central Coal & Coke Co., Kansas City, Mo., with extensive lumber interests in the South and Southwest and coal mines in Missouri, Kansas, Oklahoma, and Arkansas, went into the hands of receivers on Jan. 24. "The depression in the coal and lumber industry as a whole" and the "general economic depression" were given by Charles A. Keith, president, as the causes of the receivership. He added that it was only temporary.

Purchase New Hoists

The Lehigh Valley Coal Co., Wilkes-Barre, Pa., has purchased a 350-hp., wound-rotor, Type CW, 3 phase, 60-cycle, 2,300-volt, horizontal-type motor from the Westinghouse Electric & Mfg. Co. for use on a plane at one of its collieries.

The Southern Coal & Coke Co., Boothton, Ala., has purchased a 500-hp., wound rotor, Type CW hoist motor from the Westinghouse Electric & Mfg. Co. for use in lowering cars down a slope with an average gradient of 27 per cent. Four cars are lowered at present but the number will be increased to five. As the loads are lowered, empties are raised.

Grimes Made Managing Director

Oliver J. Grimes, for two years executive secretary of the Utah Coal Producers' Association, Salt Lake City, Utah, was appointed managing director of the Committee of Ten—Coal and Heating Industries, at the regular monthly meeting, held in Chicago, Jan. 14. Mr. Grimes will assume his new duties March 1, and will be stationed at the headquarters of the committee to be opened in Chicago. He also will have charge of the Chicago branch of the National Coal Association.

At the Chicago meeting, the committee decided to request producers and retailers to furnish data on tests of stokers and oil burners. In the same week in which the committee met, the Chicago Retail Coal Merchants' Association received the results of tests on the operation of oil burners and stokers at the East Gate and St. Clair hotels. These tests were conducted by the Commercial Testing & Engineering Co., and demonstrated that with oil at 4¾c. and slack at $5.15, stokers showed savings of as high as 35.7 per cent over the oil burners with which the hotels were already equipped.

Indiana Blast Kills 29

An explosion of gas on Jan. 28 in the Little Betty mine of the Little Betty Mining Co., Linton, Ind., resulted in the death of 29 men. Nine men were rescued after the blast, seven from behind a barricade which they had erected to save themselves. The explosion happened late in the day, after the day shift had quit work, thus greatly reducing the loss of life, as 115 men had left the mine before the blast.

Gorman Heads Hazard Group

John P. Gorman, president of the Lexington (Ky.) coal company bearing his name, was elected president of the Hazard Coal Operators' Exchange at the annual meeting of that organization held at Lexington last month. Frank Medaris, general manager, Harvey Coal Corporation, Harveyton Ky., was elected vice-president, and J. E. Johnson, secretary. Swift Parrish is assistant secretary and treasurer.

The directors are: A. L. Allais, Chicago; James Bonnyman and P. H. Burlingham, Cincinnati, Ohio; George F. Fitz, Hazard, Ky.; Frank Medaris, Harveyton; J. H. Bowling, Hugh Buford, W. S. Dudley, H. K. English, John P. Gorman, T. W. Havely, E. C. Perkins, and C. R. Ryley, Lexington; D. T. Pritchard, Lothair, Ky.

Fire Destroys Tipple

The tipple and machine shop of the Warfield Mining Co., Kermit, W. Va., were destroyed by fire Jan. 9, with a loss estimated at $26,000, fully insured. Pending rebuilding of the plant, 125 men were thrown out of work.

Oliver J. Grimes

Program Committee Named

District chairmen of the program committee of the eighth annual convention of practical coal-operating men and exposition of coal-mining equipment, to be held in Cincinnati, Ohio, the week of May 11, under the auspices of the manufacturers' division of the American Mining Congress, have been selected, as follows: George F. Campbell, vice-president, Old Ben Coal Corporation, Chicago; E. H. Suender, vice-president, Madeira, Hill & Co., Frackville, Pa.; Thomas G. Fear, general manager, Consolidation Coal Co., Fairmont, W. Va.; W. D. Brennan, president, Utah Fuel Co., Salt Lake City, Utah; Milton H. Fies, vice-president, DeBardeleben Coal Corporation, Birmingham, Ala.; P. C. Graney, general manager, C. C. B. Smokeless Coal Co., Mt. Hope, W. Va.; and V. C. Robbins, mining engineer, McAlester Fuel Co., McAlester, Okla. The district chairmen will function under the direction of national chairman R. E. Taggart, vice-president, Stonega Coke & Coal Co., Philadelphia, Pa.

Oak Hill Shaft Burns

Fire which broke out Jan. 10 in the East Shaft of the Oak Hill colliery of the Pine Hill Coal Co., near Minersville, in the anthracite field of Pennsylvania, wrought damage estimated at $10,000. One man was injured in extinguishing the flames.

West Kentucky Bureau Elects

At the annual meeting of the West Kentucky Coal Bureau, held at Louisville, Ky., Jan. 13, the following officers were elected: president, C. M. Martin, president, Greenville Coal Co., Greenville, Ky.; vice-president, K. U. Meguire, president, Dawson Daylight Coal Co., Louisville; and secretary, C. E. Reed, also of Louisville.

Safety Group in Every Field Goal of Chicago Meeting

U. S. Bureau of Mines officials, mine chiefs from all the coal-producing states, secretaries of all the operators' associations, and members of the safety committee of the National Coal Association will meet in Chicago on Feb. 26 to set up organizations in every producing field for the reduction of mine accidents and the promotion of safety work. A plan of organization is now being prepared by the National Coal Association committee for presentation at the conference, and the committee also has outlined suggestions for the exchange of information concerning mine accidents.

Emphasis is placed on accidents which have a special significance. In other words, those accidents will be stressed on which the dissemination of more or less detailed information will be helpful to the industry. The National Coal Association committee will meet in Chicago on Feb. 25 to put the finishing touches on the plan before presentation to the conference on the following day.

Oppose Compensation Law

Opposition to a state insurance fund for workers now protected by the workmen's compensation law was voiced by manufacturers, coal operators, lumber mill owners and insurance actuaries at a public meeting in Richmond, Va., last month, of the commission created by the 1930 General Assembly to study the question and report its findings in 1932. Ralph Taggart, president of the Virginia Manufacturers' Association; Lee Long, Clinchfield Coal Corporation; and Ryland Camp, of Franklin, lumber mill operator, contended that the state should not go into private business. R. T. Bowden, Virginia Federation of Labor, favored a state insurance fund.

Those opposing a state insurance fund said present conditions under the workmen's compensation law are proving satisfactory. Messrs. Long and Taggart said their companies are self-insured, paying all accident claims directly, rather than through a carrier. They preferred to be allowed to continue this method.

Woodward Makes Safety Records

Employees of the Dolomite mines of the Woodward Iron Co., Woodward, Ala., recently celebrated their 1930 achievement of no fatalities—for the first time in the history of the mine—and only 45 lost-time accidents. During 1930, 558,884 tons of coal was produced, which gave a rate of 12,419 tons per lost-time accident. Employees of the Mulga mine of the company also celebrated the passage of 1930 with no fatalities and only 36 lost-time accidents. In 1930, 348,818 tons of coal was produced, or a total of 9,689 tons per accident.

Anthracite Miners Protest Against Shutdowns

Labor upsets and changes were limited to minor skirmishes last month. In the anthracite region, a group of union officials from the northern field endeavored, apparently without success, to enlist the aid of John L. Lewis, international president of the United Mine Workers, in their fight against shutdowns in the hard-coal districts. Mr. Lewis, however, did express himself on the general situation in an address at the annual dinner of the Anthracite Club in New York City Jan. 24, when he lauded the anthracite operators for their readiness to enter into the recent five-year agreement at the old scale and contrasted their attitude with that of bituminous operators.

In the course of that address, after praising the engineering efforts taken by the producers to retain hard-coal markets and the work of the anthracite communities, Mr. Lewis called upon the citizens of the hard-coal mining areas to "pledge their unstinted support to the end that the peer of all fuels—anthracite—shall not be displaced at the American fireside by pipe lines, byproduct plants, wasted oil, convict labor, communistic coal, nor by an unholy combination of pauperized American labor and unethical freight rates."

Striking miners at Whitesville, W. Va., returned to work early in January after fruitless protest against the 10 per cent cut of the F. & G. Coal Co. A meeting called at Fairmont by the insurgent group of the union was "stolen" by sympathizers with the Indianapolis organization and the insurgent leaders were unable to address the gathering. A debate between representatives of the two factions, scheduled at Clarksburg on Jan. 25, failed to materialize when the two groups split and held separate meetings. The stream of denunciation and cross-denunciation continues in the rival publications of the two groups, with charges and counter-charges of betrayal of striking miners of the rank and file featuring the weekly and semi-monthly interchanges.

Efforts to maintain wage levels in the Kanawha district appear to be weakening. On Jan. 16 announcement was made in Charleston that twelve operators, employing between 2,500 and 3,000 men, had reduced wages in recent weeks. The extent of the reductions was not stated.

Following a failure of the joint committee of operators and representatives of the union in the Southwest to agree on changes in the contract effective April 1, a subcommittee was appointed to work out an agreement. No report has yet been made by the subcommittee on the new contract, which is to run for five years from April 1.

Announcement has been made by District 11 of the union that Abe Vales, Terre Haute, Ind., has been elected president; George W. Dudley, Linton, vice-president; and John Suttle, Linton, secretary-treasurer.

Permissible Plates Issued

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

(1) Fairmont Mining Machinery Co.; face conveyor; 3-hp. motor, 230 volts, d.c.; Approval 209; Dec. 2.

(2) Goodman Mfg. Co.; Type 312-E.J. shortwall mining machine; 50-hp. motor, 500 volts, d.c.; Approval 204A; Dec. 13.

(3) Fairmont Mining Machinery Co.; 50-gal. mine pump; 5-hp. motor, 230-500 volts, d.c.; Approvals 210 and 210A; Dec. 15.

(4) Fairmont Mining Machinery Co.; 100-gal. mine pump; 5-hp. motor, 230-500 volts, d.c.; Approvals 211 and 211A; Dec. 17.

(5) Westinghouse Electric & Mfg. Co.; "Midget" locomotive; Approval 1253; Dec. 19.

(6) Gellatly & Co.; Type A conveyor; 5-hp. motor, 230 volts, d.c.; Approval 212; Dec. 26.

(7) Fairmont Mining Machinery Co.; 100-gal. mine pump; 10-hp. motor, 230-500 volts, d.c.; Approvals 213 and 213A; Dec. 29.

On Jan. 21, according to reports from Jeanette, Pa., 300 miners at the Edna No. 2 and Herminie mines in Westmoreland County, walked out in protest against wage reductions approximating 20 per cent. The new rates posted cut pick mining from 72c. to 50c. per ton, machine mining from 50 to 40c., and day rates in like proportion.

Cement Used in Fuel Brick

A fuel brick made of coal and cement has been developed by the Grande Brick Co., Grand Rapids, Mich., in an attempt to widen markets in the face of the recent business slump. The finished product is of the regular lime brick size —8x2¼x3¾ in.—and is composed of Pocahontas slack and portland cement, in the proportions of two to four bags of the latter per ton of coal. Extensive tests, it is reported, show that the fuel burns as well as the original coal in office and home, hot-air, steam, and hot-water plants. Sales are made at $11 to $11.50 a ton, against $4 to $4.50 for slack. Average cost of making the product, including haulage, is said to be about $4.25 a ton. This excludes the cost of the coal.

Resumes Full-Time Operation

Resumption of operations on a schedule of six days a week instead of two or three days has been announced at the Republic mine of the Republic Iron & Steel Co., Brownsville, Pa. The new schedule will boost production from 25,000 tons to 40,000 tons per month.

Board Named to Organize Coal Conference

James A. Farrell, president, United States Steel Corporation; John Hays Hammond, mining engineer; Samuel Insull, public utilities magnate; Dr. Frank B. Jewett, president, Bell Telephone Laboratories, Inc.; A. W. Mellon, Secretary of the Treasury; F. A. Merrick, president, Westinghouse Electric & Manufacturing Co.; Auguste G. Pratt, president, Babcock & Wilcox Co.; H. B. Rust, president, Koppers Co.; Matthew S. Sloan, president, New York Edison Co.; Gerard Swope, president, General Electric Co.; and Walter C. Teagle, president, Standard Oil Co. of New Jersey, have accepted the invitation of Dr. Thomas S. Baker, president, Carnegie Institute of Technology, to serve as members of an advisory board assisting in the organization of the third International Conference on Bituminous Coal to be held at Pittsburgh, Pa., Nov. 16-21. Seven members of the board for the third meeting served in a similar capacity at the second meeting in 1928. Several of them will take part in the meetings next fall.

The conference meetings are organized for the purpose of finding new uses for soft coal. By bringing together the best minds in the field of fuel technology, an interchange of ideas and new methods is secured which keeps the coal industry informed of new processes which are being used throughout the world. The program this year, according to a preliminary announcement, will include papers on the carbonization, liquefaction and gasification of coal; byproducts; the mechanism of combustion; cleaning of coal and its preparation for the market; pulverized fuel; power plants; and domestic heating. Emphasis will be placed on the economics of the new processes discussed.

Nellis Celebrates Safety Record

Key men, foremen, local officials, and employees of the Nellis mine of the American Rolling Mill Co. were honored by executives of the company and state safety officials for the excellent safety record made in 1930 at a dinner and meeting at Nellis, W. Va., Jan. 8. Thirty-eight men attended the dinner and heard R. R. Stalnaker, supervisor of personnel service for the Ashland division of the company, give statistics to prove the showing made in the previous year. During the year 1930, he said, Nellis produced 303,318 tons of coal with only seven minor lost-time accidents. Out of a total of 553,683 man-hours worked, only 505 days, or 4,040 man-hours, were lost because of injuries. The frequency rate in 1930 was 12.65, against 23.97 for 1929, and in 1930 the severity rate was 0.91, as compared to 16.42 in 1929. In closing, Mr. Stalnaker attributed the greater part of the record to the efforts of the Nellis foremen.

At the annual safety meeting following the dinner, Charles W. Connor, superintendent, reviewed the safety history of Nellis mine. The movement was initiated in 1926, he said, and since that year the company has mined 1,744,037 tons with four fatal accidents. Non-fatal accidents decreased from 56 in 1926 to seven in 1930. Tons of coal mined per accident have increased from 5,743 in 1926 to 43,331 in 1930, while the frequency rate decreased from 89.9 to 12.65. Since July 22, 1930, he concluded, the mine has operated 162 days without a lost-time accident.

Other addresses were made by R. M. Lambie, chief of the West Virginia Department of Mines; J. C. Miller, vice-president of the company; L. T. Putman, general superintendent, Raleigh-Wyoming Mining Co.; and J. D. Battle, National Coal Association. E. H. Shriver, assistant superintendent, Nellis mine, presided

Obituary

Archie Forbes, 42, formerly safety engineer for the Logan County Coal Corporation, Lundale, W. Va., ended his life by shooting at his home in Huntington, W. Va., Jan. 30. Mr. Forbes was at one time connected with the U. S. Bureau of Mines and went to Huntington from Sullivan, Ind.

John L. Picton, 54, anthracite inspector for the Pennsylvania Department of Mines, died at his home in Plymouth, Pa., Jan. 15.

G. Frederick Parrish, 48, junior president, Red Ash Coal Co., Wilkes-Barre, Pa., died at his home in New York City, Jan. 28, of pneumonia following a long illness. Mr. Parrish was originally employed by Madeira, Hill & Co. At the time of his death he was a director of the retail coal firm of Burns Bros., New York City.

William R. Tapper, for many years president of the Northern Coal Co., Chicago, and recently associated with the Troy Mining Co., Troy, Ill., and the E. J. Wallace Coal Co., St. Louis, Mo., died at St. Johns Hospital, St. Louis, Jan. 13, of injuries received when he was knocked down in attempting to start his automobile Jan. 1.

John G. Hartshorn, 68, formerly vice-president of the Black Servant Coal Co., Elkville, Ill., and a prominent coal operator of Danville, Ill., died at his home in the latter city, Jan. 25, of influenza.

John B. McClary, president of the Yolande-Connellsville Coal Corporation and the Davis Creek Coal & Coke Co., with operations in Alabama, died at his residence in Birmingham on Jan. 22. Mr. McClary, who was 73 years old, went to the Birmingham district about 50 years ago from Tennessee and started work in the district as superintendent of the Pratt Mines division of the Tennessee Coal, Iron & Railroad Co. He first became associated with the Yolande interests in 1905.

Winifrede Operations To Resume

Winifrede Collieries is preparing to resume operations at the Winifrede (W. Va.) mine of the old Winifrede Coal Co., which was purchased at a receiver's sale eighteen months ago, according to D. H. Morton, president of the new company, Charleston, W. Va. About 11,000 acres of coal and mining equipment, houses and railway of the old company were taken over. Mr. Morton said that his company would spend about $60,000 on repairs to buildings and equipment, after which the mine would resume, probably within 60 days.

To Tap Missouri Coal Land

For the purpose of tapping 1,117 acres of newly developed coal land in Henry County, Missouri, owned by the Windsor Coal Co., the Chicago, Rock Island & Pacific Ry., has been authorized by the Interstate Commerce Commission to build a 2.8-mile branch extending southward from Bowen, Mo., with 4,500 feet of tipple tracks at the end. Cost of construction is estimated at $59,418. It is estimated that the territory to be served is underlaid with 3,000,000 tons of bituminous coal and is well adapted to strip mining. Annual production is placed at 150,000 tons.

Pennsylvania Mines Sold

Properties of the Coal Run Mining Co. and the Tide Coal Mining Co., in central Pennsylvania, were sold to the Kent Coal Mining Co. and the Helvetia Coal Mining Co., respectively, on Jan. 2. The Coal Run property consists of 3,000 acres of coal lands in Young township, Indiana County, and the mines have an estimated annual capacity of 500,000 tons. The Kent company, which took over the Coal Run company, was recently organized and is understood to be controlled by the Rochester & Pittsburg Coal Co. or one of its subsidiaries, and will be operated under that management. The Helvetia Coal Mining Co. is a subsidiary of the Rochester & Pittsburgh, and the Tide properties which it took over adjoin the Waterman mine.

Earnings and Employment Decrease in November

Employment in coal mining—anthracite and bituminous—remained practically unchanged in November, while payroll totals decreased 7.4 per cent. The 1,481 mines reporting had in November 321,092 employees whose combined earnings in one week were $7,931,705, according to the monthly *Labor Review* of the U. S. Department of Labor. In anthracite mining in November, there was a decrease in employment of 1.8 per cent, as compared with October, which was accompanied by a decline of 16.4 per cent in payroll totals. Employment in November, 1930, was 6.6 per cent lower than in November, 1929, and payroll totals were 2.5 per cent smaller.

Employment in bituminous coal mining increased 0.8 per cent in November, as compared with October, but payroll totals decreased 0.4 per cent, as shown by reports from 1,334 mines, in which there were in November 220,856 employees, whose combined earnings in one week were $4,782,122. Employment in November, 1930, was 8.4 per cent lower than in November, 1929, and payroll totals were 25.4 per cent smaller.

Employment and Payrolls in Identical Bituminous Coal Mines in October and November, 1930

		Number on Payroll			Payroll in One Week		
	Mines	Oct., 1930	Nov., 1930	Per Cent Change	Oct., 1930	Nov., 1930	Per Cent Change
Middle Atlantic	393	62,881	63,837	+ 1.5	$1,377,939	$1,356,737	—1.5
East North Central	158	29,618	29,516	— 0.3	705,493	708,961	+0.5
West North Central	55	5,506	5,507	......	124,987	116,265	—7.0
South Atlantic	341	54,792	55,172	+ 0.7	1,157,824	1,155,062	—0.2
East South Central	229	45,733	45,423	— 0.7	804,037	810,970	+0.9
West South Central	26	2,495	2,357	— 5.5	51,428	47,630	—7.4
Mountain	122	16,661	17,605	+ 5.7	535,368	539,371	+0.7
Pacific	10	1,405	1,439	+ 2.4	43,223	47,126	+9.0
All divisions	1,334	219,091	220,856	+ 0.8	$4,800,299	$4,782,122	—0.4

Per Cent Change in Each Line of Employment, October and November, 1930

		Employment			Payroll in One Week		
	Establishments	Oct., 1930	Nov., 1930	Per Cent Change	Oct., 1930	Nov., 1930	Per Cent Change
Manufacturing	14,008	3,066,250	2,933,327	— 2.7*	$75,362,531	$71,017,068	—6.1*
Coal mining	1,481	321,163	321,092	†	8,565,748	7,931,705	— 7.4
Anthracite	147	102,072	100,236	— 1.8	3,765,449	3,149,583	—16.4
Bituminous	1,334	219,091	220,856	+ 0.8	4,800,299	4,782,122	— 0.4
Metalliferous mining	331	49,431	46,621	— 5.7	1,328,581	1,227,399	— 7.6
Quarrying and non-metallic mining	771	36,725	33,967	— 7.5	902,510	761,172	—15.7
Crude petroleum production	568	22,418	22,002	— 1.9	804,536	778,411	— 3.2
Public utilities	11,522	731,246	719,848	— 1.6	22,055,681	21,561,684	— 2.2
Trade	9,644	351,375	358,769	+ 2.1	8,869,547	8,955,107	+ 1.0
Wholesale	1,983	64,761	63,634	— 1.7	2,001,751	1,961,572	— 2.0
Retail	7,661	286,614	295,135	+ 3.0	6,867,796	6,993,535	+ 1.8
Hotels	1,979	148,118	144,575	— 2.4	2,489,217‡	2,440,613‡	— 2.0
Canning and preserving	1,002	87,399	51,339	—41.3	1,371,667	812,620	—40.8
Laundries	166	18,649	18,322	— 1.8	371,406	366,679	— 1.3
Dyeing and cleaning	53	2,325	2,220	— 4.5	56,385	52,772	— 5.2
Total	41,525	4,835,099	4,712,082	— 2.5	$122,177,709	$115,905,230	— 5.1

*Weighted per cent of change for the combined 54 manufacturing industries; remaining per cents of changes including total, are unweighted. †Less than one-tenth of one per cent. ‡Cash payments only.

Personal Notes

R. J. BURMEISTER has been appointed general manager of the Raleigh Coal & Coke Co., Raleigh, W. Va., vice the late Ernest Chilson.

HAROLD W. COATES, a member of the editorial staff of the Cincinnati *Commercial Tribune* until its suspension this year, has been made executive secretary of the Cincinnati Coal Exchange. Increased activity on the part of coal operators centering around and in the city led the exchange to enter more fully into trade affairs, with the result that the new office, held by Mr. Coates, was created.

W. P. YANT, supervising chemist of the health laboratory section, has been made supervising engineer of the Pittsburgh (Pa.) Experiment Station of the U. S. Bureau of Mines. Mr. Yant went with the Bureau in 1920, and was assigned to work on gases. In 1923 he was made chemist-in-charge of the gas laboratory, and in 1925 was appointed to his position in the health laboratory.

SYDNEY B. HOSMER, Cincinnati, Ohio, former president of the Elkhorn Collieries Corporation, has been elected to a similar position with the Richvein Coal Co., vice Charles W. Moorman, resigned.

E. H. SUENDER, vice-president and general manager of Madeira, Hill & Co., Frackville, Pa., has been elected president of the Peoples Trust Co., of that city.

VAN B. STITH, general superintendent, Black Diamond Coal Mining Co., Drakesboro, Ky., has been made general superintendent of the Anchor Coal Co. Mr. Stith took over his new position on Jan. 15, with headquarters at Highcoal, W. Va.

J. D. MARTIN, Pottsville, Pa., assistant mining engineer, has been made superintendent of the Locust Summit breaker of the Philadelphia & Reading Coal & Iron Co., Mt. Carmel, Pa., vice Frank Landefeld.

JOHN R. DOOLIN, general manager, National Coal Co., Salt Lake City, Utah, has been elected executive secretary of the Utah Coal Producers' Association to succeed Oliver J. Grimes, recently appointed managing director of the Committee of Ten—Coal and Heating Industries.

A. STANLEY MILLER, New York City, treasurer of the Kemmerer Coal Co., has been elected president of the Gunn-Quealy Coal Co., with operations in Wyoming. Mr. Miller succeeds the late P. J. Quealy.

Ross Mining Institute Meets

C. B. Ross, retired state mine inspector, was re-elected president of the C. B. Ross Mining Institute at the first 1931 quarterly meeting held at Latrobe, Pa., Jan. 30. State Mine Inspector I. F. Roby, of Latrobe, was chosen vice-president; Robert Sterrett, superintendent of the Forbes Road, Luxor, and Hannahstown mines of the Jamison Coal & Coke Co., treasurer; and H. Clyde Elkins, of Derry, superintendent, Seger Bros. Coal Co., was elected secretary.

Short talks were made by State Mine Inspectors J. J. McDonald, of Greenburg, and S. J. Craighead, of Blairsville. William Duncan, instructor in mining at State College, also addressed the institute. Dr. J. E. Proctor, head of the Uniontown schools, outlined a program in which he sought the aid of the institute members in furnishing data for a thesis for presentation to Columbia University.

Explosives Approved

Two additions to the active list of permissible explosives were made by the U. S. Bureau of Mines in December, as follows:

(1) Liberty Explosives Corporation—Liberty No. 1: volume of poisonous gases, between 106 and 158 liters, inclusive; characteristic ingredient, ammonium nitrate with explosive sensitizer; weight of 1¼x8-in. cartridge, 106 grams; smallest permissible diameter, 1 in.; unit deflective charge, 218 grams; rate of detonation of 1¼-in. diameter cartridge, 8,790 ft. per second.

(2) Liberty Explosives Corporation—Liberty No. 3: volume of poisonous gases, less than 53 liters; characteristic ingredient, ammonium nitrate with explosive sensitizer; weight of 1¼x8-in. cartridge, 150 grams; smallest permissible diameter, 1 in.; unit deflective charge, 224 grams; rate of detonation of 1¼-in. diameter cartridge, 8,070 ft. per second.

Sales Company Formed

The Sovereign Pocahontas Co., with headquarters in Bluefield, W. Va., was incorporated under the laws of West Virginia last month to carry on coal sales activities. W. A. Richards, Bluefield, president, Ashland Coal & Coke Co., is president of the new company, formed in line with the policy of creating sales organizations to handle their own product which is being generally adopted by coal companies throughout the country. The company will handle the output of the Pemberton Coal & Coke Co., Ashland Coal & Coke Co., Buckeye Coal & Coke Co., Majestic Collieries Co., and the Iroquois Coal Mining Co.

King Coal's Calendar for January

Jan. 1—South Wales coal miners numbering 140,000 go on strike against a wage settlement offered by the mine owners under the British Coal Mines Act, providing for a reduction in pay per day with the adoption of a 7½-hour day.

Jan. 6—Explosion of gas in the Glen Rogers (W. Va.) mine of the Raleigh-Wyoming Mining Co. kills eight men of a total of 48 at work. Rock dust was credited with confining the blast to two or three working places.

Jan. 9—Hopes for the settlement of the labor controversy in South Wales fail when a conference of owners' and miners' representatives at Cardiff breaks up without reaching a decision.

Jan. 10—Official arbitrator fixes on a wage cut of 6 per cent to apply to all classes of coal mine labor in the Ruhr coal field of Germany. This action resulted from a strike of workers early in January against wage cuts and wholesale discharges scheduled for Jan. 15. Prior to the arbitrator's decision, the workers had requested a wage cut of 4 per cent, while the owners insisted on a reduction of 8 per cent.

Jan. 17—Miners' union in South Wales ratifies a wage agreement reached at the conclusion of a meeting in London on Jan. 15 by a vote of 169 to 72. Miners to the number of 140,000 were ordered back to work on Jan. 19. The new agreement runs until Jan. 31, 1934, and continues thereafter except upon one month's notice by either party.

Jan. 25—Outburst of gas in the Haig coal mine, Whitehaven, Cumberland, England, kills 35 men. Two hundred other miners employed in the section, which was two miles under the sea, escaped.

Jan. 28—Explosion of gas in the Little Betty mine of the Little Betty Mining Co., Linton, Ind., kills 29 men. Nine miners were rescued alive, seven from behind a barricade which they had erected for protection.

Jan. 29—Code of ethics to govern buying and selling of coal approved by representatives of the trade relations section of the Market Research Institute of the National Coal Association, National Association of Purchasing Agents, National Retail Coal Merchants' Association, and the International Railway Fuel Association at a meeting in New York City.

Anthracite Shipments Increase

Anthracite shipments in December, 1930, as reported to the Anthracite Bureau of Information, Philadelphia, Pa., were 4,889,057 gross tons, an increase of 689,010 tons over the total for the preceding month and a decrease of 942,477 tons from the December, 1929 figure. Shipments by originating carriers in December, 1930, as compared with the preceding month and with December, 1929, are as follows, in gross tons:

	Dec., 1930	Nov., 1930	Dec., 1929
Reading	1,176,849	929,638	1,157,152
Lehigh Valley	740,708	675,470	989,069
Central R.R. of N. J.	407,520	339,943	560,885
Del., Lack. & Western	659,655	532,061	802,112
Delaware & Hudson	692,778	629,830	786,077
Pennsylvania	519,439	451,546	563,386
Erie	412,500	397,841	611,671
N. Y., Ont. & West	82,506	72,994	142,172
Lehigh & New England	197,102	170,724	219,010
	4,889,057	4,200,047	5,831,534

Coal-Mine Fatalities Decrease in December; 1930 Rate Higher Than 1929

ONE hundred and twenty-six men were killed in the coal mines of the United States in December, 1930, according to reports received from state mine inspectors by the U. S. Bureau of Mines. This total compares with 241 fatalities in December, 1929, and 227 deaths in November, 1930. Production of coal in December, 1930, was 45,802,000 tons, a decrease of 8,621,000 tons from the output in December, 1929, and an increase of 2,473,000 tons over the total for November, 1930. The death rate per million tons of coal mined was 2.75 for December, almost 50 per cent less than in the preceding month, and 40 per cent less than in December a year ago, according to W. W. Adams, chief statistician, and L. Chenoweth, senior clerk, demographical division, writing in Bureau of Mines "Report of Investigations 3082."

For bituminous mines alone, the death rate in December, 1930, was 2.42, based on 96 deaths and a production of 39,716,000 tons. In December, 1929, the rate was 4.17, based on 196 deaths and an output of 47,046,000 tons. The December, 1930, rate was even more favorable when compared with the rate of 5.22 for the preceding month, when 199 deaths occurred and 38,122,000 tons of coal was mined. In the anthracite mines in December, 1930, there were 30 deaths. With an output of 6,086,000 tons, the fatality rate was 4.93 per million tons. In the preceding month, the rate was 5.38, based on 28 deaths and a production of 5,207,000 tons. The rate for December, 1929, was 6.10, based on 45 deaths and an output of 7,377,000 tons.

During 1930, there were 2,014 deaths in and about the coal mines of the United States, according to the latest reports received by the Bureau. With a production of 531,432,000 tons of coal, the fatality rate was 3.79 per million tons. Past experience has shown that the total will be increased about 3 per cent on account of some injuries in 1930 terminating fatally in 1931. On this basis, the rate of 3.79 for 1930 may later be increased to about 3.90, as against a rate of 3.59 for 1929, when 2,187 men were killed and 608,817,000 tons of coal was mined. As a result, while 1930 showed a reduction in the number of fatalities, a greater proportionate decrease in the production of coal raised the death rate per million tons to a much higher figure than that of 1929. The death rate for bituminous mines in 1930 was 3.41, based on 1,574 deaths and an output of 461,630,000 tons. This compares with 3.19 for 1929, on the basis of 1,705 deaths and an output of 534,989,000 tons. In the anthracite mines in 1930 there were 440 deaths, which, with a production of 69,802,000 tons, gives a fatality rate of 6.30, against 6.33 for 1929, when 482 men were killed in mining 73,828,000 tons of coal.

There was one major disaster—that is, a disaster in which five or more lives were lost—in December, 1930. This was an explosion at Madrid, N. M., Dec. 6, which resulted in five deaths. On Dec. 29, five small boys lost their lives by suffocation in an abandoned mine at Southside, Pa. This disaster is not classed as a mine accident, as the boys were in no way connected with the coal industry, though it has resulted in the suggestion that openings to all abandoned mines be barricaded to prevent a repetition of the tragedy.

During 1930, there were twelve major disasters in coal mines in the United States, taking a toll of 225 lives. This figure does not include three visitors who were killed in an explosion at Millfield, Ohio, in November. In 1929, there were seven major disasters, resulting in the loss of 151 lives. Included in the above totals are five deaths from a fall of roof in 1929, and eight deaths from a similar accident in 1930. Based exclusively on the major disasters, the fatality rates per million tons of coal mined in 1930 and 1929 were 0.423 and 0.248, respectively.

Comparative fatality rates for 1929 and 1930 are as follows:

Cause	1929	1930
All causes	3.592	3.790
Falls of roof and coal	1.941	2.008
Haulage	.678	.570
Gas or dust explosions:		
Local explosions	.082	.115
Major explosions	.238	.402
Explosives	.145	.147
Electricity	.133	.143
Miscellaneous	.375	.403

Coal-Mine Fatalities During December, 1930, 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	1930	1929
Alabama	4											4													4	9
Arkansas	1											1													1	0
Colorado	1										1	2													2	7
Illinois	6		2									8								1				1	9	17
Indiana			1		1							2													2	2
Iowa	2											2													2	2
Kansas																									0	2
Kentucky	7		2				1					10													10	20
Maryland																									0	0
Michigan																									0	1
Missouri	1											1													1	0
Montana																									0	1
New Mexico				5								5													5	1
North Dakota																									0	1
Ohio	1											1													1	7
Oklahoma			1									1			1		1								2	64
Pennsylvania (bituminous)	12	2	3				1		1		1	20													20	15
South Dakota																									0	0
Tennessee	1											1													1	0
Texas																									0	0
Utah			2									2													2	3
Virginia	1		1									2													2	1
Washington																									0	0
West Virginia	11	6	7		1		2		1			28	1				1			1				1	30	40
Wyoming	1								1			2													2	3
Total (bituminous)	49	8	19	5	2		4		3		2	92	1		1		2			2				2	96	196
Pennsylvania (anthracite)	7	6	5		6	1					2	27										1	2	3	30	45
Total, December, 1930	56	14	24	5	8	1	4		3		4	119	1		1		2			2		1	2	5	126	
Total, December, 1929	81	18	45	72	7	1	5		3		3	235							1	1			4	6		241