

COAL AGE

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JAMES H. MCGRAW, *President*
E. J. MEHREN, *Vice-President*

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R. DAWSON HALL
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Wrong Kind of Publicity

COAL operators continue to believe that they can help the coal industry by defaming the union, but a knowledge of human nature will readily show how hopeless is the task. A man is responsible in public estimation for all the faults of his family. Suppose his boy acts discreditably, will denunciation of the boy restore the father's reputation? Not an iota. The better plan is to keep silent, hoping the public will forget.

The less said about Wallins Creek, Herrin and Cliftonville the better. The union was to blame, but the miners are part of the coal industry, and the public makes no fine distinctions between the employer and employee. After all to defame the union is defensive propaganda, and that never attains its object.

The propaganda that succeeds is not negative. It blackens no one. It simply relates what good is being done, and it tells these things not when the industry is being attacked but rather when the public is receptive to good impressions. Propaganda is most successful just when it seems least needed. When the public is in kindly mood, work on its feelings; when the public is sullen stay away, for even the best of explanations will be useless. Approached when angry Old Man Publicus will round on the interrupter with a testy "You're all alike." He isn't prepared to weigh the matter.

Just now the best way to establish the industry in popular estimation is by ending the frequent explosions that kill so many men, and so powerfully impress and harrow the public mind. The industry can do nothing more constructive than to prevent these terrible holocausts. The coal mining industry by showing itself willing to rock dust its mines and to urge legislation demanding such rock dusting and by spreading the good story of its philanthropy in this matter can do more for the industry than by pages of negative propaganda.

There should be no skeletons in the coal industry's closet and if there are they should not be paraded. To publish pages about such skeletons is not constructive propaganda, however it may delight those who write it or please those who are thereby "defended." The merit of a statement lies not in its pleasuring but in the effect it creates.

Time for New Laws

MINING laws passed with the best of intentions to assure safety are liable at some time later to have the opposite effect. Thus the mining law of Pennsylvania in its General Rule No. 25 declares that "All holes before being fired shall be solidly tamped the full length of the hole," the clause having reference only to gaseous mines. It has been found, however, that with air spaces less powder will do the work, do it better and will be less likely to break down, or blow down, at the back of the hole. Less powder and more

efficient operation means less danger. But there is the law requiring tight tamping and which prevents even the use of rock dust unless the dust is tamped so tight as to lose its cushioning effect. The industry needs new regulations and so far it cannot get any relief except by legislation.

In Great Britain the regulations are made and modified by authority duly constituted for that purpose by Parliament, and in Massachusetts, New York, New Jersey, Pennsylvania, Ohio, Wisconsin, California, Oregon and Washington and perhaps other states safety rules for other industries than coal are prescribed by administrative boards. It would seem better to leave matters of this kind to properly instructed and well-informed departments than to legislators who know nothing about the industry and who are afraid to make up their minds regarding something they do not understand. So much contradictory testimony assails them, the worth of which they cannot assess. Accordingly they do nothing which is perhaps better than inconsiderate action.

Probably some hardy person, coal operator or mine worker, will endeavor to oppose the use of electric safety lamps, rock dusting, electric shot-firing and other improvements when a new code is proposed and the legislators not knowing mining are likely to be moved by the opposition, but a commission would not make up its mind on the counting of noses but on a clear knowledge of the facts. Abuse might follow it, but it would certainly achieve more than the legislature which has allowed regulation to drift so that some legal provisions are now absolutely opposed to safety.

Are More Houses Needed?

OPERATORS are finding that it takes more houses to shelter their men than in former years. Rents in most cases have not gone up, but wages have. Consequently the mine worker finds the rent far from onerous. Some do not have to work as much as a whole day to earn enough to pay the rent for a month. Contrast that with conditions in the cities where 25 per cent or more of the month's wages is given to the landlord. For this reason there has been no disposition for employees to crowd as they do in the cities to save rent. The tendency is rather in the other direction.

In early days also there were more unmarried men or men who had wives across the seas. Now owing to the immigration laws we are not getting so many foreigners and another employee is more likely to mean another tenant. The demand for a house for every adult man is here, and here to stay. The accommodation once obtained will not be readily foregone, and the restrictive bars to immigration that would let in men with more modest requirements are not likely to be much lowered.

The only possible release for house shortage other than by new construction will come from the use of

more machinery, especially for loading and as a result of a concentration of the mine workings. The situation is indeed difficult especially in mountainous regions. There, what little space could be found at one time now is filled with garages. In fact a garage usually needs to be on the most desirably level ground where the owner of the machine can maneuver safely. This erection of garages has monopolized in many villages all the building space and in many cases garages have been built till sites have played out.

In some of the mountainous regions coke ovens have been pulled down to make way for houses, the ovens not having been used for years. This leaves the space formerly occupied by ovens, wharves and coke roads available for house erection. When there are not such spaces or where the coal company is not definitely certain that it will not have to use the ovens later, then there is no way of erecting dwellings except by excavating sites for both houses and roads; the steam-shovel and retaining-wall work often costing more than the erection of the houses.

Making of Anthracite

IN THIS issue is given a brief statement of John Roberts' views on the origin of anthracite. Very interesting and convincing does his story appear. Whether it is a true picture of what happened it is difficult to determine. It is puzzling to understand at first how large areas could have become heated between 500 to 550 deg. C. until one comes to Leonard Silver's theory that coal when heated between 400 and 500 deg. C. gives out heat from its own decomposition and so autogenous carbonization takes place.

Coal, of course, has not anything like the heat-giving qualities ascribed to it in commercial language. When asked the number of British thermal units in a pound of coal we glibly say 10,000 or 14,000 but that figure is the number of units of complete combustion. The thermal units that the coal itself by its internal chemical action can emit is greatly less. Many people do not know that coal has any such exothermic quality. Mr. Silver believes the coal might emit enough heat to extend its own carbonization so that given a nucleus heated to 400 or 500 deg. the carbonization might be extended without the presence of air somewhat as a fire is extended when air is present.

Unfortunately for Mr. Roberts' theory we are met with variations in the quantity of volatile matter in anthracite. The Bernice semi-anthracite and that of Forest City and the anthracite of Dauphin County, Pennsylvania have more volatile matter than that of the Middle and Southern Anthracite fields. The semi-anthracite of Arkansas and the Pulaski County field of Virginia are also instances of incompletely carbonized. Is it possible that these semi-anthracites reached only 400 deg. or a little more and that the exothermic action of the coal could be extended but without any marked rise of temperature above that given?

It is, of course, possible to believe that a slightly different quality of vegetal matter is the cause of the difference in volatile content. However, there are so many evidences of graduation in the volatile matter of anthracite and semi-anthracite that even Mr. Roberts' well-conceived thesis will not serve to convince those who hold, as most of us do, the metamorphic theory.

Many bituminous seams have been in places subjected to temperatures which coked or anthracitized

them. In those places the coal must have been in the exothermic stage. Why did not the action extend all over the seam as Silver has assumed it did in the case of beds now completely anthracitized?

These are the problems Mr. Roberts has to meet, but they are not any more or any less difficult than those the advocates of the metamorphic theory have failed to explain. We are still a long way from answering that riddle of the carbonizing ages.

Handcuffed to Precedent

TWENTY or thirty years ago the woods stretched down to the mine villages. Mills and mines alternated in the valleys. The scream of the saw mingled with the low boom of the tippie. The miners and the lumberjacks met in the barrooms and battled for supremacy. In the stream sawdust mingled with the ochrous waters from the coal mine. The shacks of the lumberjacks were occupied by miners and when the miners left, lumberjacks took their places whenever the men were themselves not lumberjacks and miners both, for the industries recruited from one another. When the ponds froze so that the mills shut down the millmen went underground and when the market for coal sickened the miners piled lumber in the mill.

In those days wood was cheap in some sections—\$4.50 per thousand f.o.b. mill—and paint relatively dear, so at first none and later few painted miners' houses, and the only color that adorned them was that of the dogwoods, buttonwoods, maples, hemlocks, firs and oaks that covered the hills. These made attractive bungalows out of the meanest of shacks. In many places, of course, houses had been placed even so long as forty or fifty years ago in serried rows. They needed decoration, but America had then hardly awakened to the value of beauty in utilitarian structures. Some will say it has not realized that value yet in any large measure.

The economic argument was the only one that appealed and that was more than dubious, for lumber was so cheap and the mines were so transient, being abandoned as soon as they were driven to the dip or the hauls became lengthy. Consequently painting was by no means common and was done in a perfunctory way when attempted.

For a while the industry was handcuffed to a precedent which it followed even after rope haulages, electric locomotives and big pumps extended mine life.

Times have changed. Today lumber at the mines nearly everywhere has to be shipped in, and even where it can be obtained from a mill by truck or wagon it is extremely expensive. It pays to preserve it with paint. That has been conceded. It pays to keep it painted. That is the next concession. Many have made it, but a few still hope for the best and leave the repainting for the future. The methods of painting in most cases need amending, as witness the water-paint on some houses, and the uncovered knot holes and flaky coatings on others.

No longer set among trees, no longer screened by nature the modern mining home is a ghastly thing unless kept painted. Lack of paint is half of squalor. Paint is half of cheerfulness, cleanliness and content. A freshly painted house delivers its message of thrift and hope everywhere and stamps a town with an attractiveness that keeps the roster of the company filled with the names of the best workers in the region.



Village of Rachel, W. Va.

Coal Industry Has Awakened to the Value of Paint

Inferior Paint Increases Painting Cost 75 per Cent—Why Ready Prepared Paints Are Preferred—Paint Guns Save Labor—Anyone Can Sling Paint Widely but Not Well—The Underground, a Land That Paint Forgot

BY ALPHONSE F. BROSKY

Assistant Editor, *Coal Age*, Pittsburgh, Pa.

FOR many years coal mines, being at the source of timber supply, painted nothing—not even the houses or tipples. Now the coal operator is beginning to paint everything, even his cars and the steel underground. The mine needed paint more than the surface but the practice of not painting was so well established that even today what would be painted for outside use is left unpainted for the severer service underground. Even the painting of surface buildings is neither sufficiently understood nor assiduously maintained.

How apparently simple, yet in reality how extremely difficult to most coal companies is the proper protection of building surfaces. When conversing with the man in charge of maintenance of mine property, the subject of paints and painting usually proves a tender spot. It is one of his principal burdens. This is wholly unnecessary, for neither the making of good paints nor their successful application are lost arts.

The requisites for successful maintenance of equipment by painting are few in number and are within the command of every coal company. In the order of their importance, these are: (1) The selection of a paint of proper quality and of a composition suited to the nature of the surfaces to be protected and to the conditions of exposure; (2) careful conditioning and

preparation of the surfaces to be painted; (3) application of the paint by experienced men who know how to use it; (4) adequate and intelligent supervision; and (5) regularity in applying paint to all surfaces subject to deterioration from the action of the elements. All these factors are well known, yet they are not always given due consideration. This may be judged from the difficulties and failures in the painting of equipment, dwellings and other buildings owned by the coal companies.

In all mining towns and plants, for protecting either internal or external surfaces, the best quality of paint should be used in preference to that which is less expensive but of inferior quality. This is because the better paint is more economical in the end. Actual figures show that the materials cost for two coats of good paint applied by brush to a smooth surface is no more than 25 per cent of the total painting expense. The remaining 75 per cent represents the labor of preparing the surfaces and applying the paint.

In making this estimate, it is assumed that one gallon of paint will cover 600 sq.ft. of surface and that one man with a brush should paint 1,200 sq.ft. of surface in eight hours; that the average price of good priming and finishing paint is \$2.50 per gallon; that experienced painters are paid at the rate of \$1.25 per hour and that a painter's helper paid at the rate of 75c. per hour can prepare 2,500 sq.ft. of surface in eight hours.

The folly of buying paint solely on a price basis is

NOTE—The Bertha Consumers Co.'s village, shown in the head-piece, affords abundant proof that it pays to paint mining villages well and as often as necessary. Most of the houses in this picture are of the bungalow type and contain four rooms.

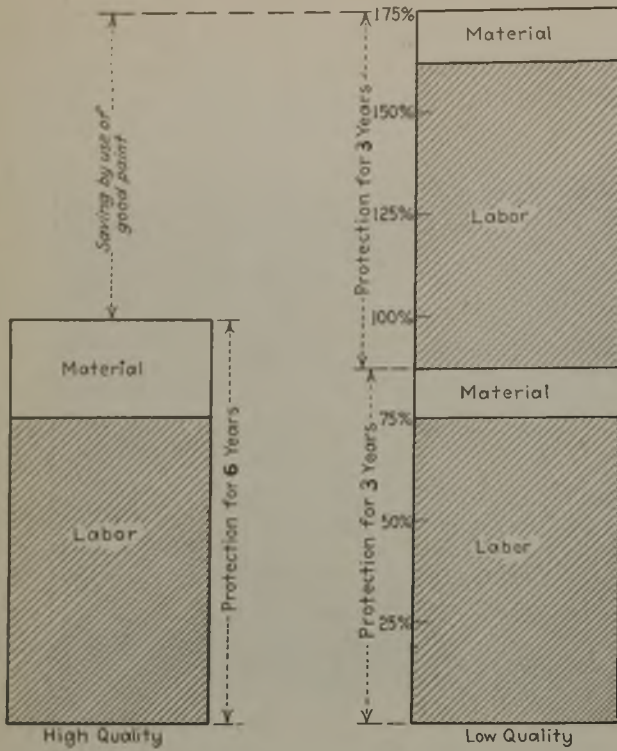


Fig. 1—Painting Cost Shown Diagrammatically

An inferior paint costs as much to apply as one that is good. Apparent savings made in material purchased are thus deceptive, being far more than offset by labor expense.

readily apparent from a comparison of the cost of the protection afforded by high- and low-quality paints. Such a comparison is shown graphically in Fig. 1. High quality paint at \$2.50 per gallon should have a life of at least six years, while that of low quality at, say \$1.25 per gallon, must be applied every three years in order to afford adequate protection. Use of the more expensive but better paint in preference to the cheaper article effects a saving in labor that represents 75 per cent of the total cost. This comparison, although strictly theoretical, is fair and reasonably accurate.

Because good paints are scientifically manufactured, by processes in which advantage is taken of the physical and chemical properties of the various ingredients, and because during certain steps in the process temperatures of manufacture are highly important, no one under ordinary circumstances should attempt to mix paint on the job. So thoroughly has the manufacture of good paint been reduced to a science, that even its coefficient of expansion is taken cognizance of and predetermined. Almost everyone has noticed at some time or other that the coat of paint applied to corrugated metal has cracked. This often results from the unequal expansions of the paint and the metal upon which it is placed.

The necessity for refinements of this nature in the manufacture of paints, particularly those intended for covering metal surfaces, is obvious when one considers the average range in temperature between midnight and noon. This sometimes amounts to as much as 60 deg. F. Paints covering surfaces that vibrate under the stresses set up by machinery, as for instance the coverings of tipples, must also be elastic and non-shattering; otherwise, they will crack and scale. As a matter of fact, however, all paints for ordinary purposes should form tough elastic coats. These, however, are only a few of the requisites that must be taken into consideration in making a paint and are here mentioned

merely to show that it is economical in the long run to use a paint of good quality that has been scientifically compounded and manufactured.

In mining towns house paints of light tint are desirable because they present a good appearance. Many prominent coal-mining companies throughout the United States invariably use paints of light color. Nevertheless, under certain specific conditions, as where houses closely adjoin tipples and consequently lie in the path of wind-blown coal dust, or are built in the proximity of coke ovens where they are subjected to the action of sulphurous gases, darker shades may be advisable.

Even the very best of paint must be used with discrimination. Thus a paint of specific composition cannot be utilized for all surfaces under a wide range of conditions. The paint used for covering the side walls of a house may be utilized on a fence also, but it should not be used on porch floors or steps. For these latter surfaces a paint must be able to resist abrasion and exposure to the weather. This is accomplished by compounding with it a durable varnish and other necessary materials. Good paint sometimes fails because it is applied to the wrong surface.

Coal companies that use inferior paints almost invariably choose the same interval between paint applications as do those firms who employ a paint of the highest quality. As a general rule, where an honest effort is made to preserve them, the buildings in mining towns are painted every four or five years. This is a period within the durability of good paint, when employed under favorable conditions.

Time is the only infallible test of the quality of a paint and its proper application. Any company that finds it necessary—although it may not choose to do so—to paint its buildings at intervals of only two or three years, is losing money in upkeep and in the application of the paint.

Good paint fails slowly by oxidation and powdering from the outer surface inward, a surface covered by



Fig. 2—Paint-Time in Lynch, Ky.

After spending millions of dollars in developing its mines and building the town and plant, the U. S. Coal & Coke Co., intends to preserve its buildings by painting them as often as may be necessary.

it requiring little preparation for repainting. After repainting, such a surface receives additional protection by reason of the old or under coats of paint not completely worn off. Poor paint fails by blistering, peeling, "alligatoring," scaling and the like, so that before a good paint can be properly and effectively applied to a surface that has already been covered by a poor paint, the underlying coat must be scraped and brushed to remove blisters, peeled spots, and the like, which are the manifestations



Fig. 3—Surface Preparation

The surface, if covered with loose particles of old paint, dust or mud, must be cleaned with a wire brush before being painted or the paint will not adhere.

of poor quality or inferior application. The cost of preparing a surface in this way exceeds any saving that may be made by the use of a poor instead of a good paint.

It is false economy to forego the expense of painting until such time as exposed wood surfaces to be coated are dry and cracked for want of paint, or the metal surfaces show signs of corrosion. Thus neglected, surfaces present a shabby appearance, deteriorate rapidly and can be repainted only at an increased cost, because additional cleaning is required. Wood that is dried out and metal that is pitted or corroded absorb far more paint than similar materials properly conditioned. More labor also is expended in spreading the paint.

At this point, a few words on the preparation of the surfaces to be treated and the tempering of the paint may not prove amiss. Best results are obtained only when every detail is carefully observed. The surfaces of outside structures should not be painted immediately after a rain, in a damp atmosphere or during cold weather. All surfaces to which paint is applied should be thoroughly dry. A warm, dry atmos-

phere, such as that obtaining between spring and fall is ideal. Under other conditions, the paint cannot be made to adhere to and penetrate beneath the surfaces treated. The paint must always be thoroughly brushed on if a good wearing surface is to be obtained.

Wood in newly erected structures should be given a thin first or priming coat and then allowed to season for a period of three or four months before the second coat is applied. This seasoning eliminates the free water in the wood cells which, when thus emptied, absorb appreciable quantities of the paint.

MUD AND DIRT MUST BE CAREFULLY REMOVED

The ground on which mine houses are built is frequently neither level nor sodded. Furthermore, few miners' dwellings are provided with roof gutters and down spouts, so that the dripping of water from the eaves spatters more or less mud upon the outside walls of the dwellings. Houses built in the proximity of coal tipples also may be covered with a thin layer of coal dust.

All foreign matter of this kind should be removed by the use of wire brushes before paint is applied. Loose scaly paint should also be removed, if necessary by scraping, brushing or sandpapering. Sap streaks in new wood should be treated with turpentine, and glossy spots on paint-covered surfaces should be roughened prior to painting anew. It is also needless to mention that repairs to the woodwork of houses or other structures should precede painting.

Priming paint should be thinned before being applied and all paint should be kept thoroughly mixed by frequent stirrings. When two coats are to be given a surface that has previously been painted, the priming coat should be thinned by the addition of undiluted raw linseed oil and turpentine. The exact quantity of thinner used will depend upon the character of the surface treated, the kind of paint and other factors. The correct tempering of paint ordinarily cannot be accomplished by inexperienced men. Intelligence and skill derived from experience are necessary qualities of any person in direct charge of painting.

Painting of buildings is admittedly attended with difficulties, but steps usually can and should be taken to overcome them. Under no circumstances should the painting of an individual dwelling be left to the occupant, neither should the responsibility for painting mine structures be delegated to surface-plant crews. Some companies solve their residence-painting problem



Fig. 4—Paint Gunning

Money can be saved by spraying the first or priming coat. With a machine a man can cover from two to four times as much surface as he can with a brush. Two sprays can be operated from a single compressor unit.



Fig. 5—Brushing on the Second Coat

Two large coal companies are agreed that the finishing coat should be applied with the brush. Light-colored paints are preferable to more somber hues for miners' dwellings.

by supplying paint to their house tenants. This is usually applied on idle days and in a haphazard manner. The only advice that can be given in a case of this kind is, "Don't do it."

As a general rule, each coal company should do its own painting. The degree of success attained in this work will depend in large measure upon the skill of the men employed, consequently as many as possible of the painting gang should be experienced workmen. It is fully realized that it is not always possible to secure the services of any large number of experienced painters, and for this reason it frequently becomes necessary to hire men that are untrained to assist in the work. This is particularly true when the painting program is large and has to be completed in one season so that a comparatively large number of men must be employed. However, there is one way out of this difficulty, and that is the employment of one or more permanent paint crews.

By this arrangement, unskilled men work in a measure as apprentices under the supervision of those experienced in painting. They are thus soon trained to do their work well, and, having received this training, they should be retained as permanent assets to the mining organization. Of course, extensive painting programs can only be performed during the summer months, and it is therefore suggested that throughout the rest of the year these men be employed as general handy men and placed in the maintenance department under the supervision of a master of maintenance.

In weather not suited to painting, they may be employed in repairing roofs, windows, porches, fences and the like. The size and number of paint crews employed may be fixed by scheduling the various jobs of painting in one or in several plants. The skill attained by these men when employed at odd jobs is ample justification for organization in the manner described.

Those companies that cannot profitably retain a permanent maintenance department or doubt its efficacy, may well let their painting jobs on contract. This, however, should be done only to reliable contractors. It is better to let out a company's painting to some outside person than to employ green men on this class of work, for good painting requires skill. Contract painting is not, however, entirely satisfactory, because an unprincipled contractor has small interest at stake; his remuneration is based on the area covered, and the

quality of his workmanship will display itself only after months or years of exposure to the weather.

The unscrupulous contractor may accordingly instruct his men to thin the paint excessively in order to save material and labor in its application. He may employ a small or large number of inexperienced men or he may use an inferior quality of paint. For these reasons, coal companies should specify the make and kind of paint that shall be used on their buildings. They may further employ one or two inspectors constantly to supervise the work.

Coal companies, operating in isolated districts where it is difficult to get painting done on a contract basis, may well "import" several experienced painters to direct the painting of their buildings. The importance of having this work done "according to Hoyle" cannot be over-emphasized.

At the present time, a number of coal companies are applying paint with spray machines. With these devices, the paint is projected in a spray by compressed air from portable nozzles or guns. The equipment consists of two units—one compressing and distributing the air and the other containing and distributing the paint. The principle of operation of this device is somewhat similar to that of a cement gun. A pressure of about 10 lb. per sq.in. is maintained in the paint container to force a steady stream of this liquid through a flexible hose to the nozzle, where it is met and atomized by a current of air conducted from the compressor unit at a pressure of about 50 lb. per square inch. A spray machine usually supplies two guns which may be moved about within a radius equal to the length of the flexible hose employed.

Last summer the Hillman Coal & Coke Co., used spray machines in painting several of its towns. It reports that the cost of applying paint by the spraying process is less than by brushing, although the spray method consumes 10 to 15 per cent more paint. The difference in consumption between the two methods is greatest on windy days when a portion of the paint used in spraying is blown away. Although authorities differ as to the durability of paint applied by these two methods, some claiming that one is as good as the other, and others asserting that sprayed paint does not last as long as that applied by brush, this company is not discouraged with the results attained. Heretofore, it has applied both coats with the spray gun, but in future it intends to apply the finishing coat with a brush.

In painting its houses at Lynch, Ky., the U. S. Coal



Fig. 6—A Well-Maintained Substation

Proper painting of wood and metal surfaces in and about mining plants must be given adequate consideration by mining companies inasmuch as total upkeep costs are materially reduced thereby.

& Coke Co., uses spray machines in applying the first coat and brushes on the finishing coat. This town contains 991 houses, which should be painted at five-year intervals. All these houses were painted during October and November of 1922, and June and July of 1923. The entire town was thus painted during these four months by a crew of forty men and two foremen, work being carried on for 10 hr. per day. One spray machine was used on this job.

The air compressor used with this spray gun was driven by a gasoline engine and carried on a truck. This latter was moved from place to place by an automobile truck which also transported ladders, paint and the like. Three men are employed to operate the spray machine; two nozzle men and an attendant who looks after both the paint supply and the compressor itself. This crew can paint an area of 20,000 to 30,000 sq.ft. in 10 hr. The automobile truck mentioned is utilized not only for moving the spray machine, but also for supplying the brush painters with equipment and materials. Nine crews of four men each prepare the surfaces for the spray machine and brush on the finishing coat and trimmings.

Painting tipples either of wood or steel and maintaining an adequate protective paint covering upon them

Of course, all tipples, regardless of their material of construction should be carefully and thoroughly cleaned before they are painted or repainted. A manufacturer of paint reports that tipples, "if of steel construction, should be painted immediately upon erection to avert corrosion. Before being painted, however, the surfaces should be washed down with a solution of acetic acid and water in equal parts, or vinegar and water. This solution will cut the grease and insure the adhesion of the paint to the metal. Either a well-prepared paint or one of many paints made especially for metal surfaces may be used." For tipples, however, a sulphur-resisting paint should always be specified, because all coal dust contains more or less sulphur.

In the interiors of mine power plants, if paint is regularly applied to the walls, floors, railings and other objects in the generator rooms it adds greatly to their appearance, affords better illumination and acts as an incentive to employees to keep the plant clean. The bad effect of steam and gases upon metal can be counteracted by the periodic painting of surfaces susceptible to such action in the boiler and pump room. Paint also protects metal from acidulous gases escaping into the plant from the boiler furnaces. The importance of carefully painted interiors in substations should also

Fig. 7—Upkeep Indications

House painting is only part of the village upkeep; roads should be scraped, ditches cleaned and fences whitewashed. Good upkeep pays both in cash and in morale. A neat town attracts the type of men who work steadily, cooperate with the management and so make operation pleasant and profitable.



are not simple tasks by any means. It must be remembered that surfaces and structural members on tipples are neither smooth nor accessible and that they are covered with coal dust and smeared with oil and grease. Painting such surfaces by hand is tedious and slow. Spray machines cut this labor cost 50 per cent or more. It is estimated that it would require eleven men twenty-six days to brush one coat of paint on the big Lynch tipple, which has an area of 101,365 sq.ft. With a spray machine, this area could be covered by the same number of men in about one-half the time necessary for brush painting. It is further estimated that good paint properly applied to this tipple should last for five years. The Gary division of the same company is of the opinion that steel and concrete tipples should be given one coat of paint each year to eliminate the uncertainty of protection afforded by paint applied at greater intervals.

Many wooden tipples throughout the country are going to rack and ruin simply for the want of paint. Owners of these structures may well take a lesson from the Bertha Consumers Co., of Pittsburgh, Pa., which takes as good care of its tipples as it does of its houses, applying paint promptly whenever needed. Wooden tipples should be painted in the same manner and with the same material as are mine villages.

be recognized by all coal-mining companies, as it is already by transit companies and in most cases by public utilities.

Structural and other steel with the exception of rails that are stored in supply racks or yards should be painted to protect them from corrosion. Such steel is normally painted as soon as erected but much corrosion may be avoided by painting it as soon as it is unloaded from the railroad car.

Both intricate and simple piping systems should be given paint protection, otherwise they may deteriorate rapidly. Pipes, other than those conducting steam and consequently covered with asbestos, ordinarily should be given a coat of durable paint of a color conforming to established company convention. A "color scheme" for pipe facilitates repairs.

Underground structures and equipment should by no means be overlooked in any campaign for paint protection, although its possibilities are more limited there than on the surface. Underground substations and pump rooms should be as carefully painted as similar stations above ground. Iron doors, gear guards, lockers and tool boxes all last longer when painted.

Another big opportunity for saving is afforded by the painting of equipment installed in underground

machine shops. Dumps and other apparatus installed at shaft and slope bottoms may also be preserved by paint, as also may steel-timber sets provided they are painted immediately upon erection. These may advantageously be painted white to increase their visibility. When a piece of mining machinery of any kind is taken to surface shops for complete overhauling, it should be painted before being returned to service. It is asserted by some operators that even the outside surfaces of mine cars should be painted, this practice being followed at certain mines. Some operators claim that painting will double the life of car bodies.

At What Heat Was Anthracite Formed?

FINDING that in South Wales, anthracite is freer of ash than bituminous coal, Dr. Strahan has surmised that it was derived from a different type of vegetation and was a metamorphosed development of bituminous coal. Jordan and Burns attempted to account for the purity of Welsh anthracite by ascribing it to the removal as chlorides of the various ash constituents, stating that chlorine may have combined with the metallic oxides in the coal to form salts and thus leached out ashy constituents.

In South Wales anthracite has sometimes, even frequently, only 1 per cent of ash. In the United States we are not faced with the problem of explaining any such low ash content. The shoe is rather on the other foot. However, in South Wales, the low ash percentage has made several geologists disposed to reject the whole metamorphic theory.

In the Darwinian theory, as popularly interpreted, all living things are in a common chain of development, the superior beings derived their existence through a line of inferior beings still existent. The progenitor of man is the ape. The Darwinians are more circumspect. Man is derived probably from some other primate, the family not being definitely known. Just so with anthracite according to some geologists; it comes from vegetable matter, so does bituminous coal, but one is not necessarily derived from the other.

Now comes John Roberts strongly supporting the metamorphic theory in a scholarly paper read before the South Wales Institute of Engineers. He declares "Anthracite is a natural product of low-temperature carbonization, the parent substance having consisted of bright coal, probably both clarain and vitrain and which has subsequently attained in the earth's crust a temperature of between 500 and 550 deg. C." Note the temperature; it is a high one and he has a hard time proving his case against authorities who have said quite dogmatically that the temperature could not have exceeded 300 deg. C. and against still others who think that if we only wait some millions of years the lignite of the Dakotas will be turned into anthracite.

He makes only a poor fist at explaining the clean anthracite of South Wales. The best he can do is to quote Dr. Lessing who places the average ash percentages of fusain at 15.59 per cent; durain at 6.26 per cent; clarain at 1.22 per cent and vitrain at 1.11 per cent. As anthracite, unless it is leached, should have naturally more ash than bituminous coal because it has lost volatile matter, the clarain and vitrain percentages of ashes given would figure nearly 2 per cent instead of 0.8 per cent which South Wales anthracite

In fact, the opportunities for saving which paint affords in the mining of coal appear to be almost limitless. Few companies seem to have made any great effort to ascertain how much can be saved in that manner; none at least have proved its limits. When these opportunities are appreciated, fewer renewals of mining equipment and appurtenances will be required. It would appear that it is high time that the coal industry woke up to the fact that large savings can be made by the use of paint. The field is as yet barely half explored but promises abundant reward to those who fathom its possibilities.

is known to contain. Mr. Roberts recognizes this and quotes Leonard Silver as having found a gas coal having only 0.5 per cent of ash with an ash content in the vitrain of only 0.486 per cent. He instances also a coal that he himself obtained from Warsaw, with a moisture content of 7.8 per cent and volatile matter of 36.7 per cent, which had 1.2 per cent of ash but only 0.43 per cent in a bright band picked from the sample.

But to get back to the carbonization theory. Mr. Roberts has little difficulty in showing that both sub-graphitic luster and iridescence can be obtained when bright coal is heated under favorable circumstances to a temperature of 500 deg. C., that the coal fuses and loses its true cuboidal form.

He shows that when bituminous coal is heated to 500 deg. C., it loses volatile matter whereas anthracite coal does not. It seems somewhat feasible to claim with Mr. Roberts that the reason why anthracite does not evolve volatile matter at 500 deg. C. is because "it has been there before" and has already lost all the volatile matter that could be evolved at that temperature. The same conditions exist with semi-coke. It does not respond to a temperature of 500 deg. C. because it has already given out all the gas that temperature can call forth.

Similarly with the evolution of ethane, propane, etc. This is given off in quantity by bituminous coal below 600 deg. C. but neither semi-coke nor anthracite can be induced to part with any at any such temperature. It is also stated that when coal is heated between 400 and 500 deg. C. it passes through an exothermic stage, that is, without the presence of air to burn away the coal, the heat of decomposition was such as to continue the heating process. In fact Leonard Silver has suggested that if, by plication of the coal measures, one portion of a bed was raised to that temperature the action might extend throughout the field provided the surrounding strata were of such low conductivity as to prevent the heat from escaping and that the pressure of the overburden was enough to keep the evolved matter liquid and not gaseous. If gases were formed Leonard Silver surmised they would perform enough external work to lower the temperature below the exothermic point.

Mr. Roberts also calls attention to the fact that much of the substance in bituminous coal is soluble in pyridine. None of the substance in semi-coke is soluble in pyridine and none in anthracite. He is disposed therefore to believe that the coal has been raised to the temperature at which semi-coke can be made. He concludes for these reasons that the temperature of carbonization to which the coal was subjected was between 500 and 550 deg. C.



Surface Works of Old Ben No. 9 Mine

How Old Ben Corporation with Rock Dust Extinguished Seven Mine Explosions

Zone System vs. Coating System—Relative Advantages of Floor, Rib and Roof Dust—Frequencies of Application—Effectiveness of Dust Distributed by Air Current—Sampling by Vacuum Cleaner

By J. E. JONES

Safety Engineer, Old Ben Coal Corporation,
Chicago, Ill.

NEARLY seven years have now elapsed since the Old Ben Coal Corporation, which considers safety as being as fundamental and important a requisite as production, commenced applying rock dust to its mines. In that time the dust used has suppressed seven explosions. From the experience gained a rough appraisal can be made of the relative effectiveness of the various types of rock-dust protection, of the means by which that protection may be afforded most readily and of the frequency with which dust applications must be made.

There are two general methods of rock dusting. The first may be called the zoning system, and the second, the coating system. The first implies placing rock dust in abundance at regular intervals throughout the mine, so located that it may be easily thrown into suspension in the event of an explosion. By this means the explosion flame is extinguished at the first rock-

dust zone or barrier with which it comes in contact. The second system entails maintaining the ash content of all mine dust at a percentage so great as to prevent ignition, thus making a practically continuous rock-dust zone out of the entire mine. Each method possesses its own advantages and disadvantages, but fortunately the weak points of the one are the strong points of the other, so that a combination of the two systems affords ideal rock-dusting protection.

The Old Ben Corporation at first adopted the zoning system, chiefly because the panel system of mining afforded an excellent opportunity for zoning the underground operations, each panel forming a separate zone. In that system of mining, main entries are driven in opposite directions from the shaft bottom; at intervals of 1,500 ft. cross entries are driven in opposite directions at right angles to the main entries. Again at intervals of 500 ft. along these cross entries, panel entries are turned in opposite directions at right angles to the cross entries. Each panel contains a maximum of 34 workers, including company men.

BARRAGES VERSUS COATING SYSTEM

AS a result of seven years experience in rock dusting, Mr. Jones is of the opinion that: The panel system of mining favors the zone system of rock dusting. The zone system of dust distribution is particularly suitable to abandoned workings which can have no other dust protection; it also affords dust for extinguishing mine fires. The coating system is less expensive than the zone system and is especially valuable when applied to roof and ribs. First two applications of dust should be less than three months apart. Three or four applications should be made during the first year and two per year thereafter. Dust should be blown into air courses at every third crosscut.

NOTE—Article read at Cincinnati convention and exposition, American Mining Congress, May 16, 1924. Article illustrated chiefly by photographs provided by W. D. Holman, mining engineer, Phelps-Dodge Corporation. They represent practice at the mines of that company.

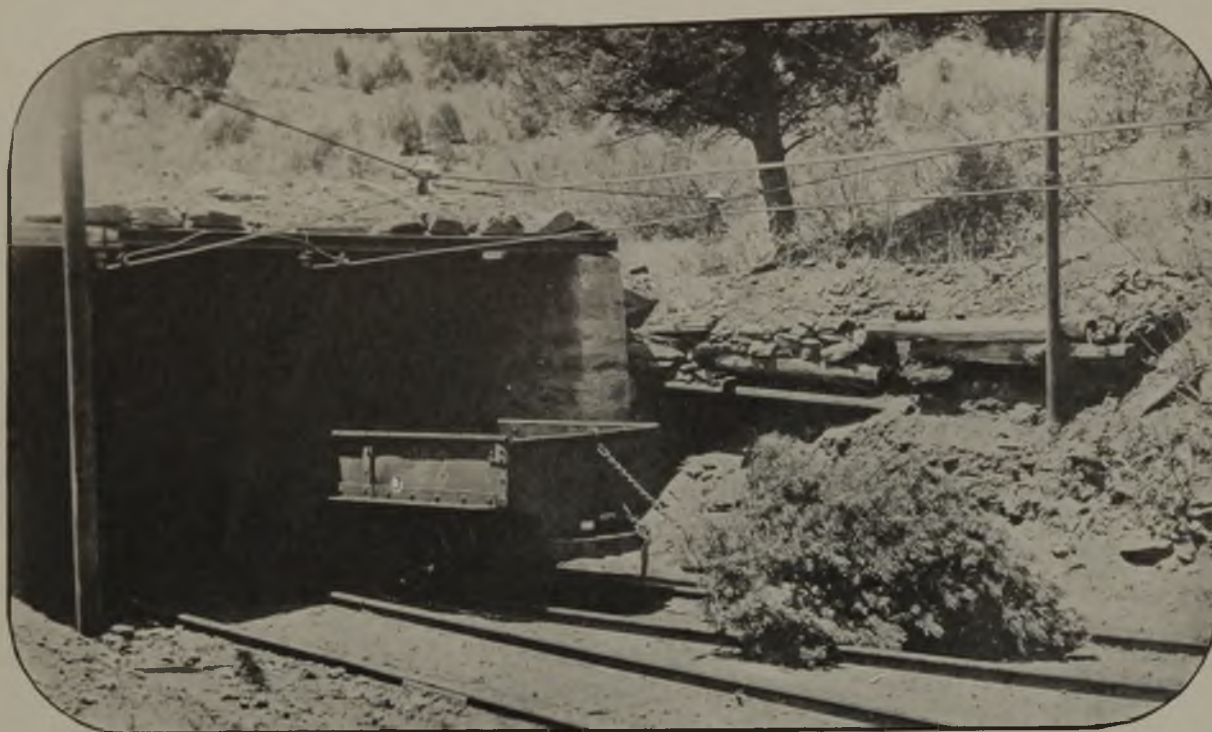


Fig. 1—"Excuse My Dust"

At the Phelps Dodge mine in New Mexico where this picture was taken the haulageway is treated with adobe dust several inches deep. Dragging the evergreen tree behind a trip stirs this dust up to float in the air current and be deposited on roof and ribs where it will be most effective

In this firm's early rock-dusting experience, a shale-dust barrier was installed at each entry intersection; later, intermediate barriers were installed in some of the mines midway between the regular barriers. The distance between panels being 500 ft., the centers of the regular dust zones or barriers had to be placed that distance apart. Each zone extends 100 ft. in each of the four directions, leaving a distance of 300 ft. between the larger barriers. When intermediate zones were installed they cut this distance in half, leaving a distance of approximately 150 ft. between zones.

Each zone consists of an Old Ben concentrated barrier installed over the haulage road, outby from each panel. The roof and ribs of the haulage road also are coated with rock dust for 100 ft. in all four directions, and dust troughs are likewise installed for 100 ft. in all four directions in the aircourses, these latter passages not being provided with tracks. Troughs and platforms piled with rock dust also are installed at the side of the track in each zone territory wherever space permits.

The type of concentrated barrier employed is an overhead construction with a capacity of from 1½ to 3 tons of rock dust. It is so built that should it be tripped accidentally or mischievously, no injury can result to any person who might be directly under it or approaching it on a rapidly moving trip. The wooden troughs containing the dust are supported and balanced in shallow notches, so that a slight force easily overturns them. Each trough holds approximately 60 lb. of rock dust.

The advantages of the zone system of rock-dust protection are: (1) The rock-dust barriers are favorably located, for they are placed at the intersections of passages which serve territories that are expected to remain in working condition over an indefinite period

of time. (2) They also, when placed at the entrances to old workings that are themselves inaccessible, afford effective protection to those abandoned areas. This is important as such abandoned places generally entail a greater hazard than is encountered elsewhere. (3) The abundance of rock dust installed under this system at regular intervals provides a barrier through which it would be difficult to force the flame of an explosion even though the gas content and the mine dust present were of a character that otherwise would permit of its propagation. (4) The system provides an abundance of rock dust in aircourses and other passages in which track is not laid. (5) Such a large quantity of rock dust is provided in each trough that even when moisture commences to harden it only a thin crust on the exterior is subjected to the hardening. (6) The system provides rock dust in quantity and condition suitable for the combating of mine fires.

The disadvantages inherent to rock-dust zoning are: (1) The cost of installing dust barriers is high compared to that incurred in the coating system. (2) Ignition of coal dust and propagation of explosions are not prevented within panels or between rock-dust barriers. (3) This method of mine protection is not equally well adapted to all systems of mining.

To a limited extent, the coating system of rock-dust protection was employed by the Old Ben Corporation at the beginning of its use of inert dust. This coating was applied on the haulage entries in the rock-dust zone in an effort to secure as efficient a supply of dust as was used in the aircourses. This dust was spread by hand.

Development of a successful rock-dusting machine was retarded by the many reports circulated concerning the difficulty of applying rock dust to a surface by

mechanical methods. Three devices have been tried, namely, a hand-power machine, one operated by compressed air on the principle of an aspirator and an electrically-driven, high-speed fan. The latter device has proved successful.

The machine now employed is of such capacity that 2,000 to 3,000 lin.ft. of haulage entry may be dusted per hour by two men, making a distribution of 2 lb. of rock dust per lineal foot. The fan is driven by a dust-proof motor, and the dust is automatically fed into the discharge line and directed onto the side of the entry. It thus requires two passages of the machine to complete the dusting of one entry. To double the speed of dusting would require only a machine of twice the capacity with a discharge pipe upon either side.

The success of the dust-coating system for passageways equipped with track has been established. Its usefulness depends on the low relative first cost of the equipment and the high ash content of the mine dust along the passageways where the rock dust has been applied.

A strong combined air-and-dust blast performs other duties that are important. Among these might be mentioned: (1) The coal dust in the path of the blast is forced into suspension in the air and thoroughly mixed with the rock dust. (2) Coal dust is forced out of crevices and small holes in the coal rib and from the timbers and is replaced by rock dust forced under

Table I—Samples Taken Prior to Coating Application

	Vola- tile Matter Per Cent	Fixed Carbon, Per Cent	Ash, Per Cent	Mois- ture, Per Cent	Per Cent Through 20- Mesh	Per Cent Through 48- Mesh	Per Cent Through 100- Mesh	Per Cent Through 200- Mesh
No. 1	26.8	46.2	20.3	6.7	100	92.7	84.1	75.9
No. 2	28.2	48.9	15.9	7.0	100	90.8	77.4	56.1
No. 3	28.0	46.5	17.6	7.9	100	66.1	40.0	39.7
Av. of 3 sam- ples....	27.7	47.2	17.9	7.2	100	83.2	67.2	57.2

high pressure into these small openings. (3) High places that are usually timbered always contain a large quantity of the finest of coal particles. Such places are easily accessible to the strong air-and-dust blast. (4) Where the coating method of applying stone dust is employed, the walls and roof are whitened, thus improving the illumination of the roadways.

The coating method of dust application requires that greater dependence be placed upon the analysis of the mine dust than is necessary with the zoning method. The Old Ben company has taken samples of dust before and after coating applications, obtaining in part the results set forth in Tables I, II and III. In Table I it will be noted that the ash content was higher than normal before dust was applied. This was because rock dust was carried by the ventilation current when the rock-dust zones were installed and deposited in the intermediate areas. Tables II and III show respectively the analyses of samples taken after the first coating application and an analysis of a sample of the shale dust itself.

These tabulations show that a finer mine dust is to be found after the application of the rock dust than before it has been applied. Sample 6 was taken four months after a coat of dust had been spread and its analysis shows that the ash content has decreased. Experience has demonstrated that the first two applications should be less than three months apart and that three or four applications should be given at regular

Table II—Samples Taken After First Coating Application

	Vola- tile Matter Per Cent	Fixed Carbon, Per Cent	Ash, Per Cent	Mois- ture, Per Cent	Per Cent Through 20- Mesh	Per Cent Through 48- Mesh	Per Cent Through 100- Mesh	Per Cent Through 200- Mesh
No. 4	13.1	12.6	69.4	4.9	100	97.2	93.8	88.3
No. 5	14.6	17.5	59.4	8.5	100	94.1	92.6	88.1
No. 6	16.4	34.3	43.5	5.8	100	93.8	86.1	75.1
Av. of 3 sam- ples....	14.7	21.5	57.4	6.4	100	95.0	90.8	83.8

intervals during the first year, after which probably two applications per year will be sufficient. One of these should be applied in midsummer when the moisture on the various mine surfaces will assist in causing the rock dust to adhere to roof, ribs and timbers.

In aircourses where no track is laid, the application of rock dust does not give the high degree of satisfaction afforded by the direct application of rock dust to ribs and roof. This is obvious inasmuch as the aircourse cannot be reached directly by the discharge from the rock-dusting machine and suitable tubing must be employed for this purpose. Thus dust can be introduced into these headings only at intervals, the length of which depends upon the distance between crosscuts.

The length of aircourse that can be efficiently treated by this method depends almost entirely upon the velocity of the air current and the length of time during which the dust is blown into the passage. Experiments show that with an air velocity of 680 ft. per minute, 61 per cent of the dust blown into suspension is deposited on the floor and 17 per cent on the roof and ribs in the first 100 ft. of distance from the point of dust introduction.

Again, the records obtained from blowing 4,000 lb. of dust in 50 min., into an air current traveling at a velocity of 680 ft. per minute, which speed of travel was maintained uniformly throughout 2,600 ft. of an entry 7x14 ft. in cross-section show the following results throughout this distance: At 100 ft. from the point of introduction, 14 lb. of dust were deposited per lineal foot of entry; at 600 ft. deposition had decreased to 9.3 oz. per lineal foot; at 1,200 ft. it was 3.8 oz. per lineal foot, whereas at 2,600 ft. from the point of dust introduction, 1.7 oz. was deposited per lineal foot of entry. From 600 ft. to 2,600 ft. from the source and apparently beyond this point, the deposition of rock dust on the roof and ribs was equal per square foot of area to that upon the floor.

It was apparent that even at appreciable distances from the source of dust introduction, a large quantity of dust is in suspension in the air, but the actual weight of the material deposited is small and the quantity adhering to the sides of the passage is of little value after even a comparatively short length of heading has been traversed.

Rock dust on the floor of an airway is of some value, but is not as effective as an equal quantity deposited on the roof and ribs. This is because of the following reasons: (1) It covers and is mixed with a mine dust of higher ash content than that deposited on the roof and

Table III—Sample of Old Ben Shale Dust

Volatile Matter Per Cent	Fixed Carbon, Per Cent	Ash, Per Cent	Mois- ture, Per Cent	Per Cent Through 20- Mesh	Per Cent Through 48- Mesh	Per Cent Through 100- Mesh	Per Cent Through 200- Mesh
5.9	0.6	90.7	2.8	98.5	98.1	97.3	88.4

ribs. (2) When in contact with a fireclay floor, rock dust is apt to absorb moisture, so that it becomes difficult, if not impossible, to throw it into a cloud in the event of an explosion. (3) Rock dust deposited on the roof and ribs is advantageously located as it may be easily forced into suspension in the mine air. (4) Dust on the floor is subjected to more rapid deterioration and is far more liable to be covered up by falls of rock from the roof than is dust on the ribs.

In order to give an aircourse a coating of rock dust, approaching in efficiency that applied to haulageways, requires application of dust at frequent intervals. Such intervals should not exceed in length the distance between three successive crosscuts, or about 180 ft. This necessitates that small well-fitting doors be installed in every third stopping. These, however, must be large enough to permit the passage of a man. Part of the equipment carried by the rock dusters operating the machine is a board slightly larger than the doorway in these stoppings, near the bottom of which is a circular hole of the same diameter as the canvas dust tube. This tube may be slipped through this hole and the board placed over the open doorway.

In order to eliminate all guesswork, dust is blown into the aircourse at each station for a definite period of 10 min. By this means, 800 lb. of dust is supplied to each 200 lin.ft. of aircourse, the present machine handling dust at this speed. This gives an average of 4 lb. of dust per lineal foot of passage treated. After the first two or three applications, the time of dusting at each station may be reduced to five minutes.

The chief advantages of the coating system of dust application are as follows: (1) The dust application is highly efficient, especially on haulage roads. (2) The cost of applying dust in this manner is low compared to that entailed by the zoning system. (3) It is possible to protect the entire mine within reach of the haulage system by increasing the ash content of the mine dust above the limit where explosion propagation is possible. (4) Coal dust, especially that which has been deposited on timbers, lagging, etc., and which is extremely fine and low in ash is dislodged and non-explosive rock dust is deposited in its place. (5) The efficiency of this method of dust application is not dependent on or affected by any system of mining that may be used.

The disadvantages of this method of dust application include the following: (1) It is impossible to treat abandoned workings. (2) Coal dust in aircourses is not thoroughly mixed with the rock dust, and it is possible that coal dust on the roof and upper portions of the ribs are not effectively coated with the rock dust. (3) The effectiveness of the protection afforded by an entry well dusted with the coating system de-

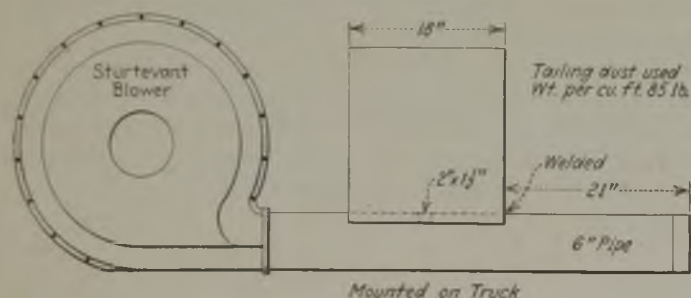


Fig. 2—Dust Blower to be Mounted on a Truck

In this device a fan driven by a motor blows a cloud of rock dust into the air current which carries it and deposits it everywhere on the mine surfaces. This machine is particularly adapted to use on haulageways and tracked headings.

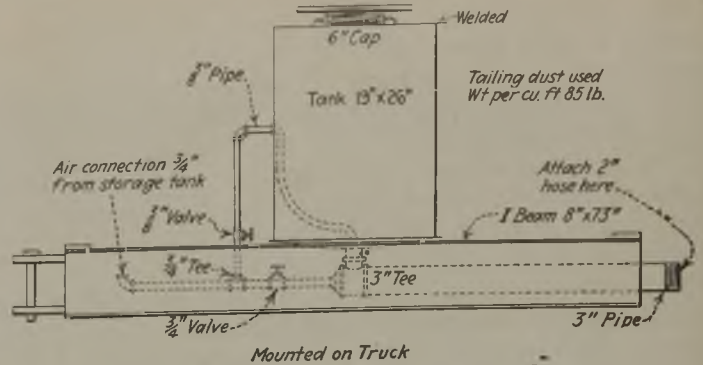


Fig. 3—A Compressed Air Dust Blower

A small compressor carried on another truck furnishes the air for the operation of this machine. A hose may be attached to the dust nozzle of this machine and the dust directed against ribs or roof anywhere within its reach.

creases more rapidly than does that of a well-installed dust zone. This arises from the passage of trips and the falling of particles from roof and ribs which displace the rock dust, as well as from the continuous deposition of coal dust. With the coating system, the ash content of the mine dust gradually decreases, so that with this method of protection, close supervision must be provided and frequent applications of dust must be made.

BEST TO COMBINE ZONING AND COATING SYSTEMS

Neither of the two systems just described can, of itself, assure complete protection against local coal-dust explosions. The greater territory protection and lower installation cost of the coating system, however, puts it in first place, and establishes it as the method to be preferred. Ideal protection can be obtained by using the zoning system as an auxiliary to the coating system. Thus a permanent barrier can be installed at the entrance to each main cross-entry section, at the entrance to each abandoned territory and at intervals of 500 ft. along aircourses. Installation of such dust barriers will be low in first cost, as troughs can be employed exclusively in all places mentioned except that a concentrated barrier should be installed at each main cross-entry entrance. In addition to affording the mine full protection against the propagation of coal-dust explosions, this method would also furnish an available rock-dust supply at regular intervals suitable for fighting fires.

As has been suggested previously the analysis of mine-dust samples in those operations employing the coating system of rock-dust distribution, is an important factor in the supervision of this work. Correct analyses depend largely upon correct sampling. The usual pan-and-brush method of dust collection is not satisfactory, because the most dangerous dust is carried away by the ventilating current.

The Old Ben company accordingly collects dust samples by air suction, using for this purpose an ordinary vacuum cleaner such as is employed in residences. From this machine, however, the handle, wheels and dust bag are removed and small bags employed to collect the samples. The motor, of course, must be suited to the electric current used in the mine. In operations not electrically equipped, a hand-operated suction device may be employed. In such mines also, some other power must be used to operate the rock-dusting machines.

The promotion of safety differs from other departments of industrial activity in that an exact knowledge of the degree of success achieved is always lacking.



Fig. 4—Another View of Machine Shown in Fig. 3

The compressor supplying air and the hose for delivery of the dust are here plainly visible. This outfit will treat almost any surface within the mine that lies within a hose length of the track.

Other departments can, in a relatively short time, show in dollars and cents, or by some other measure, the degree of success or failure that a device or method has attained. Visualization of the progress made in safety methods and appliances depends largely upon statistics and these in turn are dependent upon such a multitude of contingencies that the information desired is often difficult to obtain. The measurement and tabulation of the results of an accident that has occurred is a simple matter, but the similar treatment of an accident that has been prevented by a safety device or method is certainly not simple and the damage such an accident would have caused had it not been prevented can in many cases not be measured in any way whatsoever.

This is in part true of the experience of the Old Ben company with rock dust. In most instances, it is impossible to determine whether an explosion would have proved disastrous had it not been for the rock-dust installation. It is always possible, however, to ascertain whether the rock dust arrested the propagation of an explosion. This much is certain, the flame of an explosion has never passed through a rock-dust barrier in the mines of this company.

OF MINE EXPLOSIONS SEVEN WERE STOPPED

Since the installation of rock dust was begun in the winter of 1917-18, nine explosions have occurred in these mines. For the purposes of the present study, these may be grouped as follows: (1) Those in which the explosion flame did not reach the nearest rock-dust barrier. (2) Those that originated within a rock-dust zone. (3) Those in which the explosion flame reached a rock-dust zone, but was not of such violence as to render it certain that the explosion would not have stopped had the dust zone not been installed. (4) Those in which the explosion flame reached a rock-dust zone and manifested such violence and heat that no question exists but that a disaster would have resulted, had it not been for the rock-dust installation.

In the first group, it is immediately obvious that the rock dust played no part in allaying the explosion. Two such explosions have occurred and in both instances the rock dust at the nearest zone was thrown into suspension.

Four explosions out of the nine can be classified under group 2; one of these was violent, knocking down I-beams, blowing out concrete stoppings and charring the flame side of the collapsed concentrated barrier as far as the flame traveled. It is probable

that this explosion would have been disastrous had it not been for the rock dust. In this instance the flame-affected territory measured 100 ft. in length. The other three explosions coming under this classification were not particularly violent, but two of them developed intense heat.

One of the nine explosions mentioned may logically be placed in group 3. The evidence visible after the explosion did not indicate much flame or violence, although the men in the vicinity were emphatic in their statements that the flame filled the entire entry until it reached the rock-dust zone, where it was extinguished instantly. The origin of this explosion was less than 100 ft. from the barrier.

In group 4, two explosions may be placed. There is no question but that disasters would have followed both of these ignitions had it not been for the rock-dust barriers. In each instance, the force of the explosion was evident for over 3,000 ft., but the flame was extinguished at the first rock-dust barrier encountered.

EXPENSE OF ROCK DUSTING NEED NOT BE GREAT

Pioneer work in rock dusting performed by the Old Ben corporation has been expensive, but it would not necessarily be so for other companies seeking rock-dust protection. The experimental stage in rock dusting has practically been passed and until some other and better means for preventing coal-dust explosions is developed, this method is established.

Application of dust by the coating method assisted by barriers at suitable intervals will render essential only one-fourth the number of troughs and one-tenth the number of concentrated barriers otherwise necessary but will require approximately the same quantity of rock dust as would be necessary if the zoning system alone were employed.

Little greater expense will be incurred in efficiently protecting a mine with rock dust applied in accordance with a well-established system than is now necessary in mines employing the imperfect and unsatisfactory method of dust watering.

Experience has shown that one of the greatest hazards to life encountered in the southern Illinois field is that arising from mine explosions. It is with a feeling of considerable satisfaction and gratification that a dependable means of safeguarding life and property against this danger has been developed. It merely requires that sufficient rock dust be properly installed before the explosion occurs. Disastrous results are thus rendered impossible.

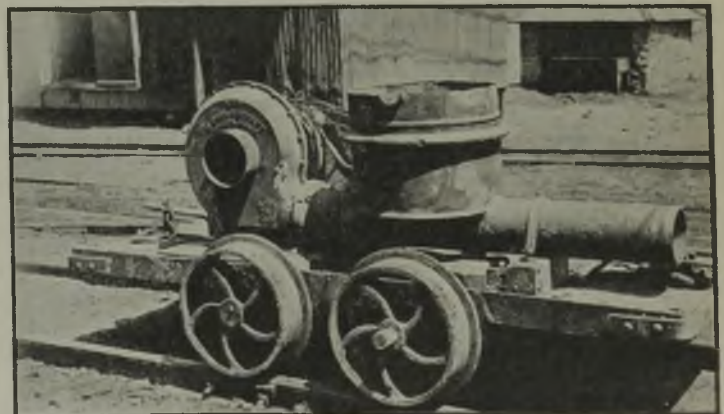


Fig. 5—The Blower Distributor of Fig. 2

This gives a good idea of the simplicity of the mechanism. This machine as well as the other here pictured is used by the Phelps Dodge Corporation in its mines in New Mexico.

How Automatic Substation Equipments Operate And What Control Features Are Supplied

Kind of Automatic Switching Apparatus Depends Upon Requirements—
Starting Impulse May Be Given by Relay, Time Clock or Push Button
—Permits Location of Station Where Best Results Can Be Obtained

BY CHESTER LICHTENBERG
General Electric Co.

THE automatic power station is a new development in electric art. It was conceived by a central-station engineer and developed by a railway engineer. It is natural, therefore, for automatic stations to be more widely used in these branches of industry. Nevertheless, automatic substations seem equally available for the transformation and supply of electric power in other industries.

Electric power for factories, mills, mine shops and other industrial enterprises usually can be quite readily regulated by automatic devices. The kind of automatic switching equipment and its application, however,

the need to provide them with an operator has retarded their location at strategic points on the power-distributing network, or forced their location in existing attended stations remote from the point where they could do the most good. Whatever the reason may have been, the successful automatic operation of these units has extended their field of application widely.

The first automatic synchronous condenser was a 3,000-kva. unit installed by the Interstate Light & Heat Co. at Hazel Green, Wis. It was started in March, 1917, and is still in successful operation. It is located at a point on the transmission lines where regulation



Early Type Unit

This equipment is completely automatic, yet provision is made for manual operation. On the extreme end of the machine is the device for raising and lowering the brushes. It sets the brushes in position soon after the starting cycle is completed. This station is located at the Pleasant Hill Mine, of the Clearfield Bituminous Coal Corp.

depends to a large extent on the particular requirements of the industry.

Generally, some form of power-transforming equipment is utilized at all industrial plants. It may be rotating equipment such as motor-generator sets, synchronous converters or synchronous condensers, or it may be static equipment such as transformers, static condensers or mercury-tube converters. All of these have been equipped with automatic switching and control for central station, railway and mine service and can readily be adapted to other industries.

Primary generating plants using water power are particularly well-suited for automatic control, but steam-operated stations have not thus far been so controlled.

Synchronous condensers form one of the simplest classes of rotating machines to which equipment for automatic control has been applied. They also form a class of power conservers which industrial organizations seem hesitant to adopt. It may be that heretofore

had previously been quite poor. It more than paid for its cost in the first two years' operation. The latest automatic synchronous condenser is a 7,500-kva. unit being installed by the New England Power Co. at Worcester, Mass., mills of the American Steel and Wire Co. In the meantime there have been a number of installations of automatic synchronous condensers but invariably by the power companies, although in most cases the condensers have been utilized for the correction of power-factor conditions caused by the industrial enterprises using the electricity.

The automatic control of a synchronous condenser is relatively simple. The starting impulse is given by any one of several familiar devices. A voltage relay, a power-factor relay, a time clock or simple tumbler switch may be used to start the set. The synchronous condenser is usually provided with an amortisseur winding and is brought up to speed as an induction motor. A compensator or Y-delta starter may be used, either being readily adapted to automatic control. Usually during the period of acceleration, the synchronous condenser field remains disconnected from the

Note—Presented before American Institute of Electrical Engineers, Birmingham, Ala., April 10, 1924.

source of exciting current and is bridged by a field-discharge resistor. This aids in giving the required starting and pull-in torque. After its field is excited, the unit has been connected to the line and full pressure has been applied to its windings, it begins to function as a power-factor corrector. A power-factor or a voltage regulator which forms part of the automatic switching equipment adjusts the field current automatically to maintain either fixed power factor or fixed pressure within the limits of the unit.

Automatic synchronous condensers are provided with the usual automatic station protective devices. The bearings are equipped with bearing temperature relays which will cause the set to be shut down before damage results if the bearings tend to overheat. The machine armature is provided with current-operated thermal relays having a time-temperature characteristic similar to that of the condenser. These automatically shut down the machine if the armature current exceeds a safe value for a predetermined interval of time. They also permit the unit to re-start automatically after a shutdown of sufficient time duration to cool the windings. These thermal devices are of the integrating type and are self-adjusting for ambient temperatures.

A grounding protective relay is also provided which causes the set to shut down in case of any leakage to the ground in excess of 50 amperes. This device protects against insulation failures and prevents undue damage. Single-phase starting, harmful single-phase running, reverse phase, loss of field, too low line pressure, short time alternating-current overload, etc., are also prevented by the usual automatic station relays.

Synchronous motor-generator sets form the next general class of rotating electrical machines which have been successfully equipped with automatic switching. Units of 150-kw. capacity are now operating in many sections of the coal-mining districts and are typical of the smaller sizes. A 2,000-kw. set is in operation on the 666-volt direct-current electrification on the main line of the New York Central R.R. and is typical of the larger sizes applied to severe operating conditions.

These units may be started on load demand or at a pre-determined time by a clock or by a tumbler switch or its equivalent. The automatic switching equipment

proceeds to function immediately the starting impulse is given. First, it checks the line voltage to determine whether it is ample to start and run the set. Next, it checks the power supply to be sure all the phases are intact and are of the correct sequence. Then, it checks the bearings, machine windings and ambient temperatures, to be sure these will permit the machines to run if and when started.

Next, it connects the motor to the source of power, either through a compensator or directly to taps on the transformer, or through the transformers if Y-delta starting is used. Then the set starts to rotate and comes up to full speed. At synchronous speed, the automatic switching equipment again functions and connects the field circuit to the source of the exciting current. When the field current has been established, the set is transferred from the starting to the running circuits. During the accelerating period the motor field remains disconnected from the source of exciting current and is bridged by a resistor in the same manner as is the synchronous condenser during its starting cycle. This permits individual adjustment of each motor so as to obtain a complete start under practically all conditions which can be found in service.

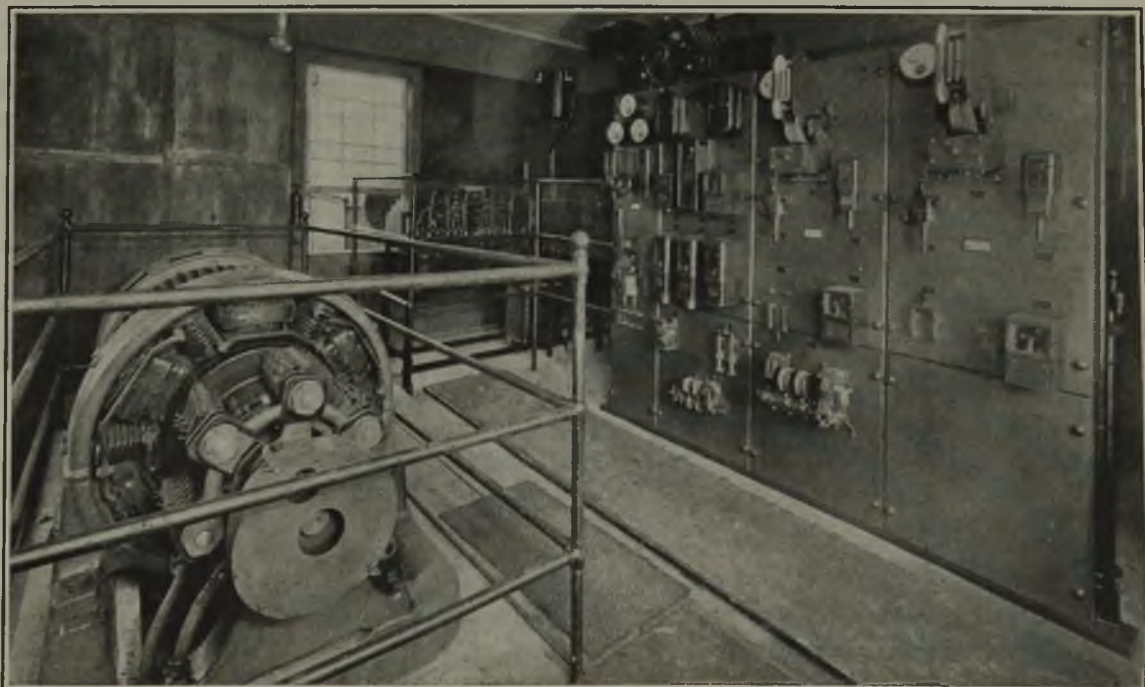
In the larger sets, a low value of field is applied while on the starting tap, and the full value after the machine is transferred to the running connections. In the smaller sets, the full value is applied in one step while the machine is running on the starting taps. The smaller sets having 250-volt or 275-volt direct-current generators are usually excited directly from the generators. Those rated for higher pressures or arranged with voltage regulators are usually supplied from an exciter either separately operated or direct-connected.

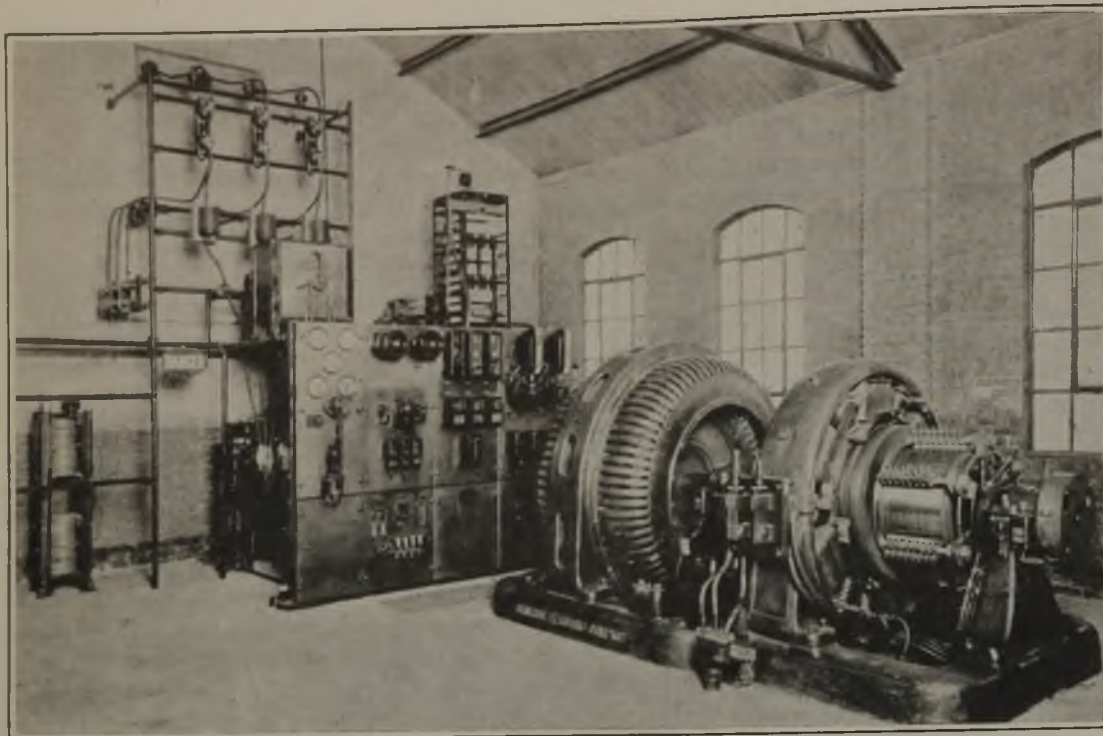
The synchronous motor has the usual automatic station protective apparatus to prevent runaway, operation without field, harmful single-phase operation, leakage to ground, short-time and long-time continued overload, bearing temperature control, etc. Some of these devices, such as the bearing temperature relays are hand reset where continued operation of the machines under any circumstances might lead to their destruction.

The number of such devices, however, is a minimum so as to insure continuity of service under all conditions, excepting where the machine might fail or other

Provides Safe Operation

The automatic control of this station recently installed at Rimerton, Pa., by the Rimerton Coal Co., makes safe operation possible. Automatic devices will be adopted in future if for no other reason than because it assures safety to men and equipment.





Automatically Operated Motor-Generator Set

This 300-kw. synchronous motor-generator set was one of the first mine units to be changed from manual to automatic operation. The stack of rheostats, shown above the switchboard, limits the load which can be applied to the machine.

serious consequences may result. Most of the other protective devices, such as the long-time delay overload relays, phase-checking relays, etc., are automatically reset and permit the equipment to resume normal operation as soon as the unusual conditions have been corrected.

The direct-current generator is provided with protection and adjustment, depending upon the service requirements. The simpler machines which may be shunt or compound-wound, are usually operated with a fixed shunt-field setting. This setting is chosen to give the desired terminal pressure, and in the case of multiple-unit sets, must be carefully adjusted to give the correct loading of the machines. Multiple-unit stations also require careful compounding of the units to permit the successful multiple operation of "hot" and "cold" machines.

The direct-current generators of large-sized motor-generator sets are frequently provided with automatic load regulation. One type is provided with a shunt-field bucking scheme. This has been successfully applied to shunt-wound generators for multiple-pressure booster service. The shunt-field current is normally furnished by the generator itself.

The current is passed through the armature of a small motor-generator set continuously rotating. This set, by suitable increase or decrease of its field current, bucks or boosts the shunt-field current of the generator, the correct amount, and gives the desired regulation. In one example, using this method of control, load swings of from 300 per cent normal to 200 per cent reversal are successfully handled.

Another modification is a compound-wound direct-current generator with the series field connected to oppose the shunt field. This type of generator is usually operated with the series field shunted by a circuit breaker which allows only a fraction of normal current to flow through the field when it is closed. Under heavy overload conditions, the circuit breaker is automatically opened and the series field carries the full line current. As soon as the overload condition ceases, the circuit breaker automatically recloses and shunts the series field.

By suitably proportioning the shunt and series fields, the direct-current generator can be made practically a constant-current machine, and service may be maintained at a reduced pressure during emergency load conditions. A number of such equipments are operating on the Edison three-wire networks of many of the large electric power corporations, and their use is being rapidly extended. Their judicious application to electrified industrial establishments would insure continuity of service under the most severe conditions short of complete and sustained interruption of the primary electric power supply.

Synchronous converters form without exception the largest single class of rotating electrical machines which have been successfully provided with automatic switching equipment. In fact, they were the first electrical machines to be so equipped, notwithstanding the fact that with a single exception they are considered the most difficult electrical machines to operate. This is principally because of the almost universal application of synchronous converters for interurban railway service where automatic stations were first widely adopted.

An automatic synchronous converter may be started by any one of the usual devices, such as a pressure relay, a time switch or their equivalent. Immediately the starting impulse has been given, the synchronous converter is connected to the starting taps on the power transformer. One-third or one-half full-voltage taps, depending on the design of the synchronous converter and transformers will usually furnish sufficient torque to start the converter armature and pull it into step. Then the converter is automatically transferred from the starting to the running taps.

During the starting operation, the shunt field is usually opened. After the machine has reached synchronous speed, its field is either flashed with the correct polarity before it is made self-exciting or is reversed until correct polarity is established.

The next step is to connect the synchronous converter to the direct-current network or feeder system and here the inherent characteristics of the converter require a different series of operations from those

provided with motor-generator sets. The direct-current terminal pressure of a synchronous converter is regulated largely by the pressure of the alternating-current supplied. By the field adjustment the direct-current terminal pressure can be regulated only over a relatively narrow range.

This field adjustment, therefore, needs to be supplemented by some arrangement for safely connecting the synchronous converter to the direct-current network, even though that network may be operating at a pressure quite different from the terminal pressure of the synchronous converter. This condition is most usually encountered in all sorts of electric haulage installations, for in all of these the changes in power demand are large compared with the feeding capacity of the supply of alternating current.

USE OF LOAD-LIMITING RESISTORS

For electric railways and commercial electric power service generally, and sometimes for industrial electric power supply, synchronous converters are equipped with load-limiting resistors. These are connected between the direct-current terminals of the synchronous converter and the direct-current network or feeder after the synchronous converter has been brought up to speed and put in operating condition, in so far as the alternating-current side is concerned. These resistors are usually shunted out in two or three steps thus gradually loading the synchronous converter with the direct-current load.

The shunting contactors or circuit breakers used for this service are usually provided with current relays having interlocks, so that the synchronous converter cannot be loaded beyond its thermal capacity. Other devices such as thermostats, located near the load-limiting resistors, permit the synchronous converter to supply current to the direct-current system within safe heating limits. The current is allowed to continue so long as the critical temperature is not reached. In many cases the reduction of the load prevents that point being attained but should the load continue heavy enough the thermostat comes into operation before the resistors and converter heat to a dangerous

degree. Should the thermostat, however, be obliged to act the converter is automatically shut down until it and the resistors cool. After the equipment has cooled sufficiently, it is again automatically started and placed in service. In some cases, where economy in design and manufacture permit Y-delta starting, the load-limiting resistors are shunted out in only one step. With this combination and with suitable transformer design, the Y-delta arrangement may be used to take the place of one step of the load-limiting resistors.

The load-limiting combination available for, and used with, synchronous converters permits their wide application to all electrified industries. It permits the use of the economical synchronous converter in many places where motor-generator sets were formerly considered most desirable. For certain few applications, they are excelled only by specially designed motor-generators with automatic load-regulating features.

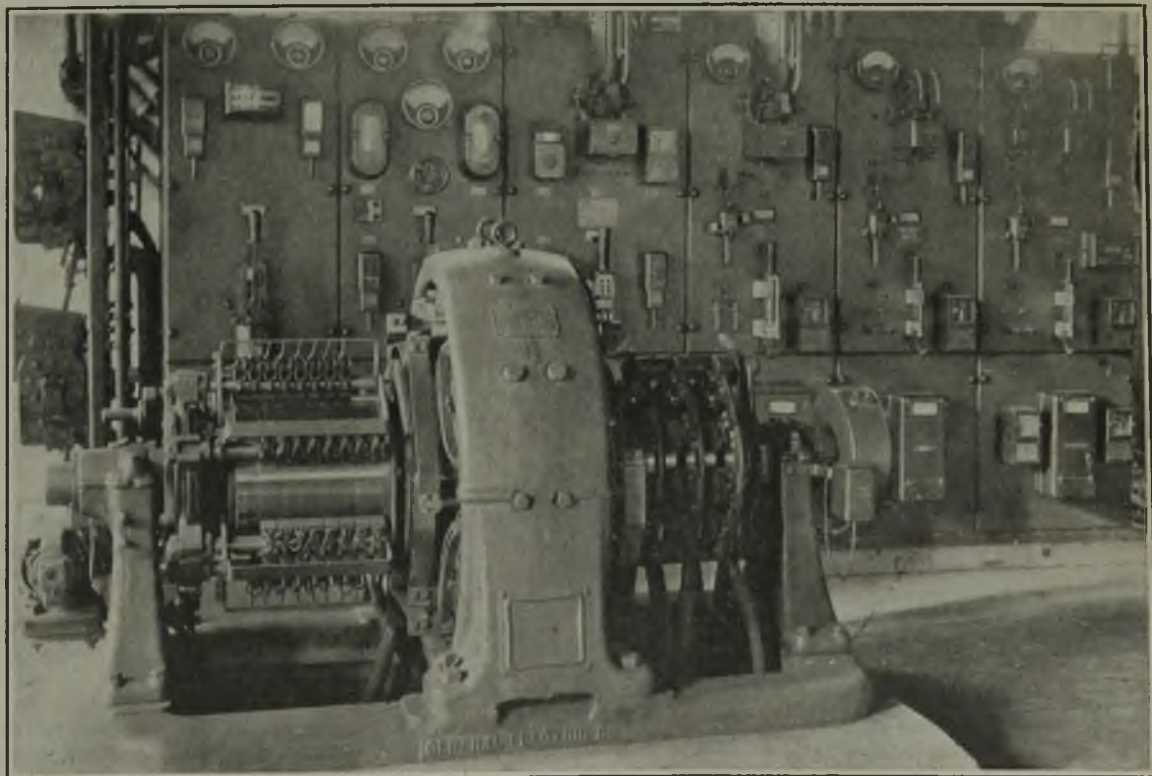
Synchronous converters for automatic operation are provided with the usual automatic-station protective features such as bearing and resistor temperature relays, short and long-time continued alternating-current overload relays, single-phase starting and harmful continued single-phase running preventive relays, low alternating-current pressure starting or operating preventive relays, overspeed switches in combination with a shunt trip circuit breaker, leakage to ground relays, etc.

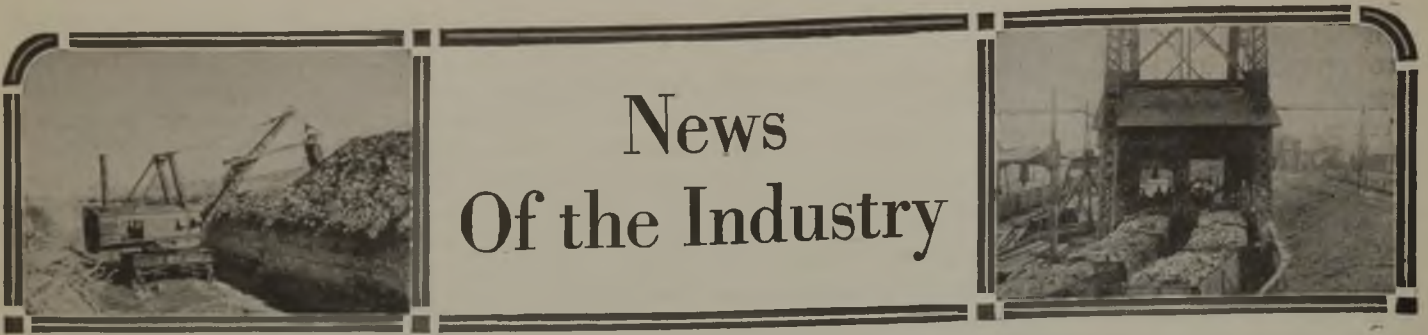
Other electric power-transforming machines, such as balancers, mercury-tube converters, and static transformers have been made completely automatic and equipments thus protected are now in successful operation. Their design is usually patterned after the best manual-operation scheme, except that the time for the switching is generally reduced from minutes to a few seconds.

Feeder breakers on alternating-current and direct-current networks are now not only automatically tripped on overload, but also automatically reclosed when conditions are correct and safe. Many such protective systems are available, each being particularly designed for its individual application.

Rotary-Converter Outfit

Ordinarily automatic equipment appears to be extremely complicated. However, this station was installed and put in operation by the Black Diamond Coal Co., Drakesboro, Ky., in much shorter time than that usually required to install a manually operated station.





Republican Platform Adopted at Cleveland Has Broad Bearing on Coal Industry

Conciliatory Attitude Toward Labor Seen in Planks Reaffirming Collective Bargaining and Opposing Compulsory Arbitration—Coal Plank Lifted from One of President's Addresses

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

Cleveland, June 13.—The coal-mining industry is concerned with more than the coal plank which just has been indorsed by the Republican National Convention. The declarations in the labor plank and the labor section of the railroad plank are of greatest importance to the coal industry. Briefly these planks reaffirm collective bargaining and intimate that the function of the Railroad Labor Board should be modified, and the point is brought out unequivocally that the party "does not believe in compulsory action at any time in the settlement of labor disputes." This puts the party on record against compulsory arbitration and in doing so accepts one of the more important declarations of the Harding Coal Commission, which could not see its way clear to recommend compulsory settlement of disputes.

Platform's Labor Planks

The attitude of the platform toward labor is conciliatory. This attitude is emphasized by the favorable reference to the child labor amendment, which long has been sought by the American Federation of Labor. At first glance it appears that the party managers have attempted to placate the United Mine Workers, among others of the powerful unions, but it is doubtful whether the utterances amenable to such an interpretation will impress the miners as much as that section of the coal plank which says, "When, through industrial conflict, the supply is threatened, the President should have authority to appoint a commission to act as mediators and as a medium for voluntary arbitration." The mine workers of late have felt so strong that they have disdained mediation except in an instance or two when they felt themselves in danger of losing.

The reaction among some of the political observers in Cleveland is that the labor vote will be influenced less by the professions of the platform than by the past utterances of the candidates. Since assuming the office of President Mr. Coolidge has done nothing which has incurred the enmity of labor leaders unless it be the veto of the postal salary increase. His policy in the Boston police strike at that time

made him anathema to labor leaders.

As for General Dawes, labor is expected to look upon him as being upon the side of the employers. It is quite apparent that the Republican candidates will not be indorsed by the American Federation of Labor. It is doubtful, however, that any candidate that the Republicans might have chosen could have obtained the indorsement of that body and it has been demonstrated again and again that while the American Federation of Labor acts unitedly in such matters as wage demands, it is unable to deliver labor's votes. In a political campaign impressions are made by individual candidates upon individual workers.

The coal plank as it stands is practically lifted from one of the President's messages to Congress. It embodies the same ideas and expresses them in practically the same words. It commits the party to full publicity of the kind foreshadowed by Senator Oddie's references to the coal bill which he partly prepared but which he did not introduce.

To Probe Labor Disputes

The plank commits the party to investigations of all labor disputes by special representatives of the President and commits the party to federal control of distribution during any period of shortage of supply. The precise means of obtaining those ends are not set forth but on the whole the plank is an acceptance of the major point in the Coal Commission's report.

The platform, with its commitments in regard to the World Court, and the selection of General Dawes as Mr. Coolidge's running mate mean participation in Europe affairs. In the matter of farm relations it is apparent that the party has materially altered its policy. The party has not only underwritten the World Court but it has underwritten the Dawes reparation plan. By giving its moral support to these two endeavors, the Republican Party has entered into world affairs just as definitely as would have been the case had it indorsed the League of Nations. This seemed to be the opinion of the majority of the delegates to the convention, even though they did not like to admit it.

Coolidge's Coal Plank

The Republican presidential platform adopted by the convention at Cleveland, June 11, contains the following "plank" on coal:

"The price and a constant supply of this essential commodity are of vital interest to the public. The government has no constitutional power to regulate prices, but can bring its influence to bear by the powerful instrument afforded by full publicity.

"When through industrial conflict its supply is threatened, the President should have authority to appoint a commission to act as mediators and as a medium for voluntary arbitration. In the event of a strike, the control of distribution must be invoked to prevent profiteering."

In the selection of General Dawes the party virtually agrees to uphold his hands in the reparations agreement which he effected. This means the moral support of the party for the securities of the bank which the Dawes report proposes, which must be sold largely in the United States. The party has taken action which tends to approve the contention of Ramsay MacDonald, the British Premier, that isolation declarations on the part of the United States are "pompous folly." The Democratic Party favored rushing into the League. Four years ago the Republican Party held aloof from any definite commitments as to foreign relations. Apparently now it has adopted a middle course between these extremes.

All of this has a bearing on coal. If it stimulates rehabilitation in Europe our prosperity will be stimulated, particularly in the agricultural regions, thereby removing one of the sores on the body politic. To reduce the amount of discontent and to bring about a more stable business situation means the consumption of more coal. By increasing the ability of Europe to buy, our export trade will be increased, and that means that more coal must be consumed.

The platform again touches coal in its indorsement of immigration restriction. This means that the great stream of recruits from whom mine workers once were made will not be restored. The mines will have to bid for labor in competition with other industries. This will help to maintain the present level of wages and pave the way for increases when new levels of prosperity have been reached.

Study and Fun Mark Three-Day Outing Of Illinois Mining Institute

Causes and Remedies of Explosions, Cleaner Coal, Radio Communication
Between Mine and Surface and Safety Training Come in for
Discussion on Mississippi River Cruise

Special Dispatch to Coal Age

Ninety Illinois mining and machinery men spent three days cruising the Mississippi between St. Louis and Paducah, Ky., on the new stern-wheeler "Cape Girardeau" last week enjoying a real vacation full of good fellowship and discussion of mine problems. It was the eleventh annual summer outing of the Illinois Mining Institute. The boat left St. Louis the night of June 12, and returned the morning of the 15th.

A right good outing it was, too, mingling horseplay with studiousness, fair weather with a midnight Mississippi hurricane, calm moonlight drifting with a race against the "Tennessee Belle," and languorous hours on deck with a vigorous visit at the new plant of the Atlas Powder Co., 12 rough miles back from the landing at Grand Tower, Ill. Many of the men saw river sights new and entertaining to them, they all enjoyed the hospitality of Paducah, Ky., and Cape Girardeau, Mo., where they were driven about in automobiles, and they landed at St. Louis Sunday morning, June 15, with memories to cherish until next summer.

Variety of Papers Read

The program was administered in short doses in the main saloon of the boat except for one afternoon session on the forward deck. President D. D. Wilcox and Vice-President Ted Lewis presided. Causes and some remedies of explosions were treated by L. D. Tracy, superintendent of the Bureau of Mines station at Urbana, Ill. Martin Bolt, director of the Illinois Department of Mines and Minerals, proposed some methods of reducing accidents. A paper by Arthur M. Hull, appealing to operators to produce cleaner coal, was read, and S. W. Farnham, mining engineer for the Goodman Manufacturing Co., was most entertaining in his illustrated talk about primitive coal mining in India. Something new was sprung by A. B. McCall, of the Springfield (Ill.) High School faculty and consulting engineer for the Bureau of Mines. He announced that the radio club of the high school, on which he keeps a guiding hand, had established radio communication between mine and surface by vertical conduction of voice currents through the ground. This has never been done before, he said.

Harold C. Culver, of the Illinois Geological Survey, told the Institute of a general Illinois coal report soon to be issued and asked for suggestions as to material mining men thought should be in it. The discussion of the institute centered on safety mainly.

An appeal for cleaner coal was made by Arthur M. Hull, editor of the *Midwest Coal Retailer*, in a paper read by Frank M. Tirre, of St. Louis. Mr. Hull pointed out that only 20 lb. of bone in a ton is 1 per cent and that often the percentage of unnecessary ash shipped

with coal runs up to 30 and 35, all of which takes the full coal freight rate and helps to make the consumer disgusted not alone with the dealer who sells it but the operator as well. This sort of thing is responsible for part of the loss of market to oil producers. The miner ought to be convinced that had he always loaded out clean coal fewer mines would be shut down nowadays and fewer men would be jobless, the paper said.

Two heated arguments were started by Martin Bolt's discussion of accidents in Illinois—the old ones about whether the British miner is safer than the American and whether the Illinois com-



Dr. George Otis Smith

Director of the U. S. Geological Survey, who will represent the United States as a delegate to the world power conference at London, June 30-July 12.

penetration law is a help or a detriment. Both went 10 rounds to no decision as usual.

Scanning 40 years, he said in the first eleven years the ratio of deaths was 2.7 per thousand men employed and 4.1 per million tons produced. Accidents causing the loss of 30 days or more working time were 8.8 per thousand men and 17.6 per million tons. During the next decade, when machinery and electricity came in, deaths per thousand dropped from 2.7 to 2.3 and non-fatal accidents per million tons declined from 4.1 to 3.8. From 1904 to 1913, when gigantic mines were built and tonnage doubled, the fatality rates per thousand men rose to 2.9 but accidents decreased from 13 to 10.2 per thousand men and from 22.3 to 15 per million tons. Then came the compensation law period. Between 1913 and 1923 deaths decreased from 2.9 to 2.2 per thousand men and from 4.2 to 2.6 per million tons while non-fatal accidents jumped from 10.2 to 28.6 per thousand men. Exactly 62.5 per cent of all the non-fatal accidents

of the whole 40 years took place in that period.

He said 60 per cent of all Illinois accidents are due to falls of roof and coal and to mine cars and motors and that therefore attention ought to be centered on them. The industry should not accept the tremendous accident total as "just part of the business," but should regard mining as a most dangerous occupation, as in England, and hedge it about with more intense safety effort. He advocated making safety part of every miner's training, the adoption of a strict safety code and the rigid enforcement of this code, not by the employer alone but by a joint board of miners and operators.

While the ensuing arguments were rollicking gayly along some things of interest also were said. D. D. Wilcox declared greater safety and greater production go hand in hand and that he always has observed in his own company that attention to safety means more economical and intelligent operating methods. In one mine, where a manager made a special safety effort, not a single accident occurred in 30 days and production went up 20 per cent. A great deal was said by various members about how the compensation law enables crooked miners to collect from their employers for all sorts of questionable accidents; yet president Wilcox was cheered when he appealed to companies to "be fair minded toward the men and the majority will be fair minded toward the companies." He thinks there must be more underground supervision, for today it is all but impossible for a boss to see each of his 75 or 100 men more than a minute or two a day.

Would Train Miners in Safety

L. D. Tracy argued for safety training for every miner. Men who have taken it are seldom hurt. A. B. McCall suggested that safety training be required before any man gets a certificate. Frank Tirre said great safety effort can be made through such organizations as the Superintendents and Managers Association of the Fifth and Ninth Illinois districts, to which 77 men now belong and meet regularly to discuss every sort of operating problem with very personal interest. The fact that these men visit each other's properties and discuss them critically at the meetings stimulates a lot of effort at the mines out of a sense of pride. C. J. Sandoe, a general superintendent, found that accidents were reduced so much merely by requiring detailed reports of every one from mine managers that insurance rates were lowered.

No company should ever let its men get the idea that it doesn't care much if they get hurt, according to J. H. Haskins. Real interest in safety by one company he knows of permitted that company to run two years and produce two million tons of coal without a major accident.

Tom Hunter argued that accidents certainly would be reduced if shotfirers all set their own shots. One thing the whole Institute agreed upon was that where there is good feeling and mutual interest between men and companies, accidents are reduced and that there is no better way to reduce them than to develop such good feeling.

Coal Contracts Awarded for New York Institutions

The Shawnee Fuel Co., of New York City, was awarded contracts for furnishing and delivering to various New York State institutions 82,000 net tons of run of mine coal, as a result of bids opened May 27 by the State Department of Purchase at Albany. The prices ranged from \$1.45 to \$1.69 per ton f.o.b. mine. This company also obtained the contract for furnishing and delivering 2,000 net tons of slack coal to the Binghamton Hospital at \$1.99 per ton f.o.b. mine. Deliveries on all contracts are for the period between July 1, 1924, and March 31, 1925. Other contracts awarded follow:

Titan Fuel Corporation, New York City, 25,600 tons run of mine to the Central Islip Hospital and 3,600 tons to the Kings Park Hospital, Long Island, at \$1.48 per ton f.o.b. mine; George D. Harris & Co., New York City, 960 tons run of mine to Farmingdale (L. I.) Hospital and 800 tons of smokeless coal to the Willard Hospital at \$1.48 and \$1.69 per ton, respectively; E. L. Hedstrom, Buffalo, 400 net tons 14-in. lump to Fredonia Normal School at \$2.15 per ton, f.o.b. mine; Hartmann Coal Co., New York City, 28,120 net tons run of mine to various institutions, \$1.65 per ton f.o.b. mine; W. G. Morton, Albany, 3,360 tons run of mine to Matteawan State Hospital, \$1.47 per ton f.o.b. mine; George H. Foster Coal Co., Pittsburgh, Pa., 4,160 net tons nut and slack at \$1.30, and 400 net tons three-quarter lump, \$1.70 per ton f.o.b. mine; and Commercial Coal Co., New York City, to institutions in New York City, 7,200 tons run of mine, \$4.24 per ton, f.a.s. dock; 13,600 tons run of mine, \$4.29 per ton, f.a.s. dock, and 600 tons slack, \$3.96 f.a.s. dock.

For furnishing and delivering 500 gross ton broken coal, 1,650 tons egg, 4,290 tons stove, 1,545 tons chestnut, 5,900 tons pea coal, 10,000 tons No. 1 buckwheat, 20,000 tons No. 2 buckwheat



Ira C. Cochran

Reappointed commissioner of the American Wholesale Coal Association at its recent convention at White Sulphur Springs, W. Va.

and 10,000 tons No. 3 buckwheat to various institutions the D. L. & W. Coal Co., New York City, was awarded the contract at the May circular price, subject to an increase of 10c. per month to Oct. 1 and a decrease in April next, deliveries to be made between July 1, 1924, and June 30, 1925.

Martin F. Shea, of New York City, was awarded the contract for delivering 700 tons of egg coal, 11,590 tons stove coal, 1,590 tons chestnut, 39,900 tons No. 1 buckwheat and 200 tons of grate coal to other institutions at \$2.64 f.o.b. mine for the buckwheat, \$8.85 for stove and \$8.75 for chestnut and grate.

Lewis Suspends Autonomy of West Virginia Union

The International Executive Board of the United Mine Workers on June 14 suspended the autonomy of District No. 17, which includes practically all of West Virginia, and Percy Tetlow, of Ohio, was named head of the district by John L. Lewis, International president of the union.

Headquarters for Mr. Tetlow will be established in Charleston, W. Va., and he announced that Van A. Bittner, of Pittsburgh, International representative, would be placed in charge of the northern part of the district, with headquarters at Fairmont. The order became effective June 16.

That policies of the International union had not been applied and enforced with sufficient vigor in District No. 17 was given as the reason for the suspension. It also was explained that all of the district and subdistrict officers of the union in West Virginia appeared before the Executive Board and filed a petition asking that the International union assume charge.

Union policies hereafter will be pursued vigorously in West Virginia and "differences of opinion among the former district officials resulting in conditions menacing to the union will be eliminated," according to an announcement at union headquarters.

Operators and Engineers to Study Mine Safety

More than 200 coal-mine operators and mine safety engineers will meet in a Midwest coal-mine safety conference called by the Mining Section of the National Safety Council at St. Louis, June 25 and 26.

The tentative program is as follows: Wednesday, June 25, 10 a.m., "Prevention of Haulage Accidents," Ralph D. Brown, superintendent O'Gara Coal Co., Harrisburg, Ill.; "Mine-Rescue Work in Illinois," by a rescue-station superintendent; 2 p.m., "Ventilation and Dust Control," J. E. Jones, Old Ben Coal Corporation, Chicago; "Safe Handling of Explosives," by a powder company man. Thursday, June 26, 10 a.m., "What the Joseph A. Holmes Safety Association Is Doing for Accident Prevention"; "Getting Results from Organized Safety Work," C. L. Colburn, U. S. Bureau of Mines, Pittsburgh; 2 p.m., "Mine Gases and Their Effect on the Body," Dr. H. G. Bristow, professor of chemistry, St. Louis University; "Infections from Wounds," Frank Farrington, district president of the miners' union of Illinois, will lead the discussion of Mr. Colburn's paper.

Gilbreth, Efficiency Expert, Dies in Telephone Booth

Major Frank B. Gilbreth died suddenly from heart disease Saturday, June 14, in a telephone booth of the Lackawanna R.R. Major Gilbreth was one of the first to take an interest in motion studies in their relation to efficiency of operation. He was born in Fairfield, Me., in 1868 and was a contracting engineer in Boston from 1895 to 1904 and in New York until 1911, when he became a consulting engineer. In 1917 he was made consulting major of engineers in the U. S. Army and was on active duty at the general staff college at Washington. He organized the Taylor Society for the promotion of the science of management.

Union Demands Dismissal Of Town Officials

A bombshell was tossed into the town of Sydney Mines, one of the leading bituminous coal mining centers of eastern Canada, when Jubilee Local of the United Mine Workers demanded of the Town Council that every official of the town be dismissed. The order was signed by the president and secretary of Jubilee local, which has headquarters in Sydney Mines. It is charged that the officials of the town, from the Mayor down, favored the operators, and discriminated against the Communist leaders of the union for the eastern Canada district. Dire threats were made in the event that the order was not heeded. Some time ago the Council of New Waterford, another mining center, dismissed the entire fire department because members played cards and checkers with executives of the Dominion Coal Co.

Upholds I.C.C. Ruling in Joint Mine Case

The order of the Interstate Commerce Commission regulating the distribution of cars among soft-coal mines located on two or more railroads was approved by the U. S. Supreme Court in a decision handed down June 9. The effect of this ruling is to limit the number of cars that a mine located on and served by more than one railroad may order to 100 per cent of its rated capacity. Prior to this decision a joint mine was permitted to order 150 per cent of its rated capacity.

The New River and other companies operating bituminous-coal mines in West Virginia succeeded in the lower federal courts in having annulled the order of the commission which applied to mines located on two or more railroads, a rule with regard to car distribution different from that applying to mines reached by only one road.

Rock Dusting Lowers Insurance Rate

Gas and Dust Explosions Have Killed Nearly 6,000 Men—Insurance Cost Would Have Been \$14,000,000 at Present Rates—Explosion Risk May Be Lowered 85 per Cent

By G. B. BUTTERFIELD
General Manager Associated Companies,
Hartford, Conn.

Owing to the increasing frequency of explosions in coal mines during the winter of 1923 the compensation insurance carriers have made an exhaustive study of the causes of mine explosions.

They found that in the United States from 1839 to 1923 inclusive 7,907 men were killed in bituminous mine disasters. Of this number 5,722 men, or 72 per cent, lost their lives in gas and coal-dust explosions. If workmen's compensation laws had applied to all of these explosions, the compensation cost alone, at the average of \$2,500 per death, would have been \$14,305,000. This is an enormous loss measured in dollars, to say nothing of the families which were deprived of their supporting heads by these preventable explosions.

The U. S. Bureau of Mines' experiments verify the fact that if rock dust and bituminous-coal dust are mixed in such proportions as to have a mixture of about 45 per cent coal dust and 55 per cent rock dust, the coal dust will not explode. Coal mines can be rock-dusted by hand, but this is rather ineffective and expensive. The best way to rock dust a mine is with the use of mechanical equipment and in many mines home-made equipment is doing the work quite satisfactorily. A small motor mounted on a track drives a centrifugal fan, which forces the rock dust through a nozzle, and on the end of the nozzle there is a sphere filled with small holes through which the rock dust is forced with much pressure. This sphere is held in a fixed position, thus insuring the complete spraying of the roof, ribs and bottom.

Mine Dust Should Be Tested

In specifically ascertaining the time when the mine should be rock dusted again, certain areas of the dust at various places in the mine should be tested. A mine official should select an area about 8 in. in width across the roadway and take samples over this section—one from the roadway, one from the ribs and one from overhead on the roof or timbers. These samples should then be run through a ten-mesh sieve and that portion of the sample which will not go through the sieve should be rejected; the remainder is the sample which should be tested for the percentage of combustible content. A simple machine known as a volumeter has been invented and placed on the market for this purpose.

The leading coal-mine compensation insurance carriers recognize the rock dusting of bituminous-coal mines as a real safety factor in the prevention of mine explosions, and have incorporated this subject as Item 1-C in the Bituminous Standards. The specific wording of this paragraph is as follows:

"All entries, aircourses, manways, room necks and entries or approaches

(other than old room necks to old and abandoned sections, shall be rock dusted with limestone, shale or other inert dust approved by the U. S. Bureau of Mines. The application shall be of sufficient amount and of sufficient frequency to maintain on the roof, ribs, bottom, timbers and all places of lodgment sufficient inert dust so that the combustible content of the resulting mixture of rock dust with coal dust shall not exceed 45 per cent at all times. That is, the resulting mixture of rock dust with coal dust shall not exceed 45 per cent of coal dust, allowing the remaining 55 per cent to be rock dust."

Reduced Rates for Good Records

The insurance carriers have decided to allow a reduction in rate varying from 10c. to 20c. per \$100 of payroll, depending upon the past history of catastrophes in each specific state.

The compensation insurance carriers are so sincere in their belief in the good results to be obtained by rock dusting that they feel that approximately 85 per cent of the deaths in mine explosions would be averted if the mines are rockdusted.

Let our motto be "That every bituminous coal mine in the United States be rock dusted before Oct. 1 of this year."

Lewis to Probe Anthracite Outlaw Strikes

Special Dispatch to Coal Age

Scranton, Pa., June 16.—John L. Lewis, International president of the United Mine Workers, is to conduct an investigation into the series of outlaw strikes affecting collieries and coal companies in the Pittston region of the anthracite field. To this end he will send five international organizers to the field. Yesterday, following the receipt of telegrams from President Lewis, the general grievance committee of the Pennsylvania and Hillside Coal & Iron Co. strikers, numbering 11,400, who have been idle the past week, voted to return to work on Tuesday morning. Much opposition to the motion was encountered from the radical elements on the committee. It is possible that the International office investigation will get under way this week and before it is ended many of the radical powers in the local organization may be dethroned.

Horace M. Swetland, Noted Publisher, Dies

H. M. Swetland, president of the United Publishers Corporation, which publishes *Iron Age*, *Dry Goods Economist*, *Automotive Industries* and other important business publications, died at his home in Upper Montclair, N. J., June 15. He was one of the pioneers of modern industrial publishing and had been a leader in raising journalistic standards through his activities in the Associated Business Papers. At one time he was owner of *Power* and of *Engineering & Mining Journal* (as it was then called), both now owned by the McGraw-Hill Company.

Mr. Swetland was born in Chautauqua County, New York, in 1853. In 1880 he came to New York as reporter and as subscription and advertising salesman of the *Boston Journal of Commerce*. In 1884 he became Boston representative of *Power*, later coming to New York and assuming the management of that publication. In this capacity he was associated with James H. McGraw, now president of the McGraw-Hill Company, and Emerson P. Harris. The association was discontinued in 1888 when Mr. Swetland purchased *Power*, the ownership of which he retained until he sold it to the late John A. Hill in 1900.

In 1911 he organized the United Publishers Corporation, which included publications in the steel, automotive, building and textile fields. He was elected president of that corporation and retained that office to the time of his death. He also was president of the National Publishers Association, the Class Journal Company, the Federal Printing Company, the U. P. C. Realty Company and the Swetland Realty Company, and a director of the Commercial Trust Company.

Mr. Swetland's work and contribution to industrial publishing are well set forth in the following tribute paid to him by his lifelong friend and former associate, Mr. McGraw:

"Mr. Swetland's success as a man and a publisher was due to a rare combination of personal qualities and business acumen. He was a tireless worker, had great penetration, concentration and perseverance. He was an organizer of the first rank and was always a co-operator. His ideals in publishing were high, service to the readers of his publications being his first consideration. The publishing business has lost an outstanding figure in the passing of Horace M. Swetland, but his work will endure in the great institutions to which he gave unstinted devotion, and in the lives of those whom he trained in the technique of publishing and encouraged to make the best of their opportunities."

The Circuit Court, sitting at Fayetteville, W. Va., on Monday last, nolle prossed all indictments against C. Frank Keeney, Fred Mooney and William Blizzard, in connection with the armed march in Logan County in 1921. It was indicated that the efforts of the state would now be directed to the prosecution of active participants in the march.

Accidents at Coal Mines During April Resulted In Death of 234 Miners

Accidents at coal mines during April, 1924, caused the death of 234 men, according to the U. S. Bureau of Mines. The fatality rate for the month was 6.44 per million tons of coal produced, as compared with 7.06 for the previous month, 3.71 for April last year and 4.94 average for April during the 10 years 1914-23. The high fatality rate for April, 1924, was due to the Benwood explosion, on the 28th, which resulted in the loss of 119 lives. The rate for bituminous mines alone was 6.91 per million tons (including the Benwood disaster), as against 3.48 for April last year and 4.67 average for April for 10 years. For anthracite mines alone the rate was 4.41 per million tons, as compared with 4.96 for April, 1923, and a 10-year average rate of 6.28. Of the 234 men killed in April, 1924, 30 were killed at the anthracite mines in Pennsylvania and 204 at bituminous mines throughout the country. Underground accidents at both classes of mines numbered 220, shaft accidents 4, and surface accidents 10.

During the first four months of 1924 the records show a total of 993 lives lost, indicating a death rate of 5.06 per million tons. For the same period last year the rate was 4.08. The 4-month average rate for bituminous mines alone was 5.03 in 1924 and 3.84 in 1923; for anthracite mines alone it was 5.19 in 1924 as compared with 5.36 in 1923.

"Major disasters"—that is, disasters in which 5 or more lives were lost—

World's Highest Mine

The height of mines is not ordinarily as much of a factor as the depth. However the developers of the new Black Diamond mine of the Black Diamond Fuel Co., in the Clear Creek region of Utah, claim their mine holds the palm for height. It is 9,500 ft. above sea level, which makes it the most exalted coal mine in this country and probably in the world barring only a mine or two in the Crested Butte field of Colorado. But this is conveniently counted out because the coal mined there is not bituminous.

numbered five during the period Jan. 1 to April 30, 1924; the resulting loss of life was 384. During the corresponding months last year there were four similar disasters with a loss of 140 lives.

Comparing the causes of the fatal accidents in 1924 to the end of April with those for the same period in 1923, the records show reduced fatality rates attributable to falls of roof and coal, haulage equipment, explosives and electricity. Increased rates are shown for explosions of gas and coal dust. The following figures indicate the fatality rates per million tons for the main causes of fatal accidents at coal mines:

	Year 1923	January to April 1923	1924
Falls of roof and coal	1.807	1.808	1.756
Haulage	.644	.649	.534
Explosions of gas or coal dust	.580	.770	2.082
Explosives	.177	.185	.142
Electricity	.117	.106	.082

Coal Contracts Awarded for Navy Yards and Stations

The Navy Department awarded contracts June 10 for the supply of 221,150 tons of bituminous coal for use at navy yards and naval stations during the next fiscal year as follows:

Brinker Coal Co., Johnstown, Pa., 2,000 tons, for delivery at Iona Island, at \$5.30 per ton; 28,000 tons, for delivery at Indian Head, \$5.49.

Castner, Curran & Bullitt, Inc., New York, 5,500 tons, for delivery at Chelsea, Mass., at \$6.30 per ton.

Dexter & Carpenter, Inc., New York, 1,050 tons, delivered at Bellevue, \$4.63.

Hall Bros. & Co., Inc., Baltimore, 450 tons, for delivery at Fort Mifflin, Pa., \$4.90; 1,200 tons at Annapolis, \$6.05; 2,500 tons at Annapolis, \$4.96.

W. M. Hollerback, Philadelphia, 12,500 tons, Lakehurst, \$5.27.

W. C. Huber & Co., Philadelphia, 1,800 tons at Lake Denmark, at \$6.15.

Johnstown Coal & Coke Co., New York, 1,500 tons at Yorktown, Va., \$4.82.

Lake & Export Coal Sales Corporation, Chicago, 5,500 tons at Great Lakes, \$2.24; 34,500 tons bituminous screenings at Great Lakes, \$1.60.

Morrisdale Coal Co., Philadelphia, 30,000 tons at Philadelphia, \$4.54 under chutes and \$4.69 at wharf.

Pocahontas Fuel Co., Inc., New York, 5,500 tons at Portsmouth, \$5.03; 4,000 tons at Charleston, \$5.42.

L. A. Snead Co., Washington, 400 tons at Alexandria, \$4.95; 21,000 tons at Hampton Roads, \$5.03; 25,000 tons at Norfolk, \$5.03; 50,000 tons at Washington, \$4.90.

Coal-Mine Fatalities During April, 1924, 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.	Gas explosions and burning gas.	Coal-dust explosions (including gas and dust combined).	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, atip, 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.	1924
Alabama	6				1								9												11	8
Alaska																									0	0
Arkansas																									0	1
Colorado		2											3												3	6
Illinois	2		1										3												4	18
Indiana			1										1											1	1	7
Iowa	2												2												2	1
Kansas																									0	0
Kentucky	5	1	1	1									8												8	9
Maryland	1												1												1	0
Michigan	1												1												1	0
Missouri																									0	0
Montana																									0	2
New Mexico	1		1										2												2	0
North Dakota																									0	3
Ohio	3		1										4												0	0
Oklahoma																									4	9
Pennsylvania (bituminous)	7	2	2							1			13	1											0	0
South Dakota																		2							15	31
Tennessee			2										2												0	0
Texas																									2	0
Utah	1																								0	1
Virginia	1	1	1										1												1	2
Washington	2												4												4	7
West Virginia	13	3	3		119								138												3	1
Wyoming			1																						1	40
Total (bituminous)	46	10	14	1	120	1	3	1	1	1	1	196	24	1	1	1	2	2	2	1	4	1	4	6	204	148
Pennsylvania (anthracite)	8	3	4	2	1	1	3	1	1	1	1	5	24	1	1	1	2	2	2	1	4	1	4	30	40	
Total, April, 1924	54	13	18	3	120	2	4	1	1	1	1	220	52	2	1	1	4	4	1	4	4	2	10	30	234	
Total, April, 1923	84	13	38	2	17	17	6	2	2	2	2	516	77	2	3	1	6	6	1	1	4	7	15	234	188	



Practical Pointers For Electrical And Mechanical Men



Making Electric Equipment Safe to Use

Rife with suggestions for the prevention of accidents from electrical apparatus are the practices of the Union Pacific Coal Co. contained in an article by D. C. McKeehan, chief engineer, in a recent issue of the magazine published by that company.

He states that automatic starters are being installed for all motor-driven fans as part of the electrical safety program. Experience with these starters has shown that minor interruptions in the power circuit have no effect on the mine ventilation as the fan automatically starts when the current is restored. In the day or during the night reliance may be placed on these starters. They will do their work with almost human intelligence.

For example, power interruptions for, say, an interval of five minutes which may occur perhaps at midnight when few are around will not necessarily cause the fan to stand idle and the mine to go unventilated awaiting the next morning when someone will arrive who will set it in motion. With such an automatic starter the fan will "get busy" as soon as the power is restored.

Automatic reclosing circuit breakers have been in use for several years. Originally they were intended for the protection of generators against excessive currents and short-circuits. The Union Pacific Coal Co. is using them to sectionalize parts of the mine so as to limit the power that may flow into a short-circuit or a faulty piece of apparatus, and also to withhold power from defective locomotives or mining machines and thus not delay the whole mine pending the location of the faults, which are given the best of in-



A Fan That Will Not Be Idle When Power Is Available

Automatic starters on fan drives obviate the necessity for sending a man to the fan house to restart the motor after a power failure. If the voltage is taken off the line during the night and the fan remains idle until morning, large and dangerous accumulations of gas may result and cause explosions.

trouble. Have you thought of this as one of the functions of the automatic circuit breaker available for your mine?

In the near future all underground transformers in the Union Pacific Coal Co.'s mines will be installed in fireproof vaults so constructed that in case flame issues from a burning transformer the ignited transformer oil and insulation will cause a steel door to close and cut off the current to the transformers. The threshold to these vaults will be raised so that in the event of a transformer exploding the burning oil will not flow from the room.

In many instances the Union Pacific Coal Co. is no longer reducing the voltage from 2,200 volts to 220 volts but is carrying the higher voltage direct to the larger motors. The engineers have long realized that the 2,200-volt cir-

cuit, with its insulation and protection, are much safer than the transformers which also require a 2,200-volt supply. Of the two evils, the transformers are regarded as the greater.

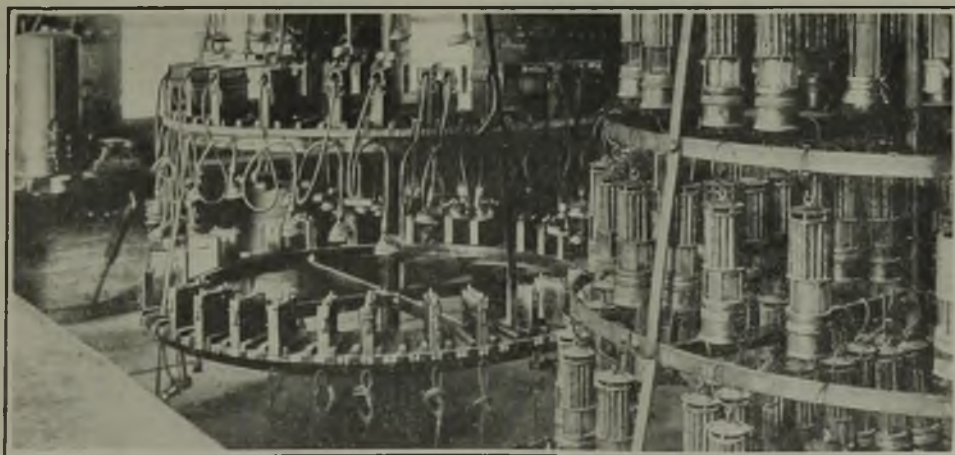
However, the use of 2,200-volt apparatus underground is not practiced without certain dangers that cannot go unheeded. First, these circuits carry high power and it is imperative that the protecting oil circuit breakers trip, that is, disconnect the lines, at times of trouble. Second, there are dangers if the metal parts containing 2,200-volt conductors are not properly grounded. This includes the motor frames, oil switches, relays, compensators, starting and controlling apparatus and all parts that may come in contact with 2,200 volts due to breakdown of the insulation.

It has been the intention of the Union Pacific Coal Co. for many years to ground all parts that high voltage may make dangerous, but as the machinery is removed to different parts of a mine or to different mines such matters are often overlooked, and it is necessary that all workmen become vigilant for their own safety as well as for that of others.

An object is protected by grounding when it is connected to the general mass of earth in such a manner as to insure at all times an immediate discharge of electrical energy without danger.

Men working on high-voltage lines short-circuit all conductors so that the switch or breaker will "kick out" in case it is accidentally closed. They, however, often neglect to ground the circuit as well as short-circuit it and this may bring about an extremely dangerous condition.

Although a 2,200-volt system may be free of ground yet there always exists a potential from either line to the



Electric Mine Lamps Reduce Fire Hazards

Nothing has contributed more than the electric safety lamp to make the work of the miner safer and easier. Sparks and smoke from the old-fashioned oil lamps were a continual source of danger. Oil-soaked clothes and timber were also responsible for serious burns and mine fires.

earth. The condition becomes dangerous if only one line is charged or one side of the circuit closed, as the voltage to ground would be dangerous to one working on either line and at the same time touching the earth.

Grounding is also resorted to in order to protect one from being subjected to a voltage to the earth that is higher than the normal voltage of the circuit.

Suppose a transformer breaks down and allows the 2,200 volts to come in contact with the 110-volt secondary. We would then have a voltage of 2,200 to earth, but, by grounding one side of the 110-volt circuit, in most cases, a voltage higher than 110 volts to earth cannot exist and the high voltage cannot manifest itself in a dangerous way.

Phasing Out a Converter

Before starting any converter for the first time if it is necessary to predetermine the direction of rotation a test of the wiring should be made to insure that the connection of the incoming line phases to the machine rotate in proper sequence. With each start by an induction-type starting motor or from the direct-current side some method for indicating synchronism between machine and line is also necessary.

The elementary principle of the method of determining when two alternating-current machines are of the same frequency and are in phase is illus-

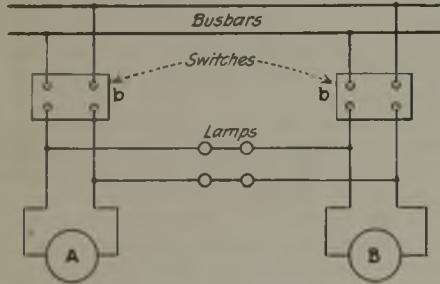


Fig. 1—Connections Used When Synchronizing Circuits

The diagram shows the wiring of the lamps when synchronizing two single-phase circuits. When the voltage of the two circuits are exactly equal and in phase the current in the lamps is zero. Under this condition there is a balance of the two opposing pressures at the terminals of the lamps.

trated by Fig. 1 in which A and B represent two single-phase machines, the leads of which are connected to the busbars by the switches C and through two series of incandescent lamps. It is evident that as the relative positions of the phases of the voltages change from that of exact coincidence to that of exact opposition, the flow of current through the lamps varies from a minimum to a maximum. If the voltages of the two machines are exactly equal and in phase the current through the lamps will be zero and, as the difference in phase increases, the lamps will light up and will increase in brilliancy until the maximum is reached when the phases are in exact opposition. From this condition they will decrease in brilliancy until completely dark, indicating that the machines are again in phase. The rate of pulsation of the brilliancy of the lamps depends upon the difference in frequency; i.e., in the speeds of the machines. In cases of

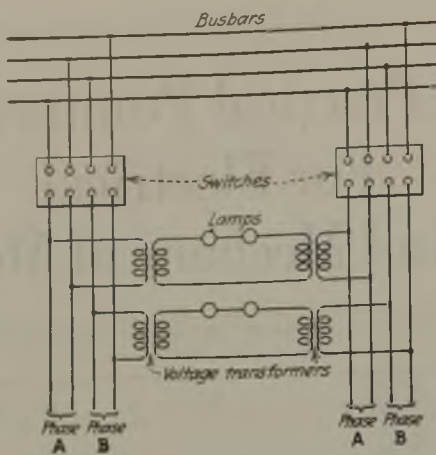


Fig. 2—Two-Phase Testing

By reversing the connections of one of the primaries or one of the secondaries of the transformers dark lamps had previously indicated synchronism. Smoother results are generally obtained when paralleling circuits if synchronism is indicated by the lamps when dark.

polyphase machines, if the phases are in the correct relation to each other, all the lamps, will be bright or dark at the same time. If this is not the case, the leads should be interchanged until this condition is obtained.

In order to determine whether the lamps will be bright or dark for a given connection of transformers when the machines are in phase, remove the main fuses from one machine, or disconnect the machine back of the shunt connection, and throw in the main alternating-current switches with the other machine at full voltage. Since both primaries are now connected through the switches to one machine, the lamps will be in the same condition as when the main or paralleling switches are open and both machines are in phase. If the lamps burn brightly and it is desired that they be dark for an indication of synchronism, the connections of one of the primaries or one of the secondaries of the transformers should be reversed. Dark lamps as an indication of synchronism are recommended.

The lamps should be adapted for the highest voltage which they will receive, i.e., double-normal voltage. Fig. 2 shows the connections for a two-phase machine. For three-phase machines the connections are modified to correspond. For six-phase machines the phasing can be most easily done on the high-tension side for which condition one of the above connections will apply.

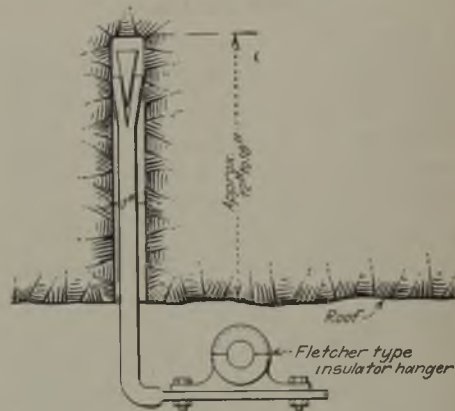
Feeder Wire Hanger for Mine Service

In some mines the proper method of suspending feeder wires and return cable presents quite a problem. The rib ordinarily is the logical place to put them and consequently there is on the market today any number of good hangers for supporting all sizes of wires and cables. However, even the best hanger has its drawbacks under certain conditions especially the types requiring lag screws. A hanger using two small lag screws is not always a permanent job because of the difficulty in getting a good bearing under the screws. Again, the hanger using one

large lag screw is not always good because of the difficulty of drilling one large short hole.

The accompanying figure presents a hanger which is a trifle more costly but has proved its worth by years of service. It cannot be purchased on the market but can be readily made by any blacksmith. It is made out of 1- or 1½-in. round iron, bent as shown in the figure, and flattened at one end to support the insulator. The other end is made like a wedge-bolt used so often around mines for foundation bolts, etc.

To install the hanger a hole only has to be drilled and with the use of a



Cable Support That Is Made Secure

The wedge-bolt fastened into the roof where a long hole can be drilled is greatly to be preferred to hangers that require only a shallow hole that easily breaks. Where such improved hangers are used greater spacing between supports is permissible.

sledge hammer the hanger is in place in a few minutes. The hanger is rigid and by being placed in the roof is in nearly all cases more permanent than the types that are fastened in the side walls of the gangway.

O. E. KENWORTHY.

Direction to Run Belt Splices

Spliced belts should be run in such a direction that the thin edge of the splice on the inside of the belt will be the first part of the splice to run over the pulley. See the illustration, Fig. 1.

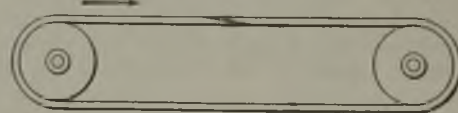


Fig. 1—How Spliced Belt Should Run

Note that the thin edge on the inside surface of the splice runs over the pulley first.

This is the rule in most favored use; however, there is considerable difference of opinion on this matter. Frequently disagreement with the above rule is founded on the action of the air or of the pulley surface turning back the lap and thus causing the splice to break down. The splice in a rubber belt should be run in the same direction as the splice in a single leather belt.

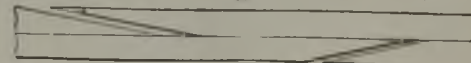


Fig. 2—Double Leather Belt

Here the recommendations are that the thin edge of the laps on both the outside and inside surface should point away from the direction the belt travels.



Production And the Market



Bituminous-Coal Market Continues to "Mark Time" As Moribund Industrial State Persists

The feeling is quite general that unless there are false bottoms in the storage bins of the holders of big reserves, stocks are approaching the danger point in some centers, which means, of course, that a number of consumers who have been strangers to the coal market are nearly due to resume the placing of orders for fuel. In some sections, such as the New England district, where the depression in the textile industry is particularly marked, the reserve piles are still large, and consequently little activity can be expected for some time. Reports of bad business are quite general, however, the reduction in coal movement being strikingly reflected in the reports of earnings by the railroads. The formality of nominating President Coolidge and adopting a platform by the Republican convention at Cleveland last week removed another excuse for hesitancy in business, and next week will see the Democratic convention out of the way. Meanwhile the coal trade continues to mark time.

More Government Contracts Awarded

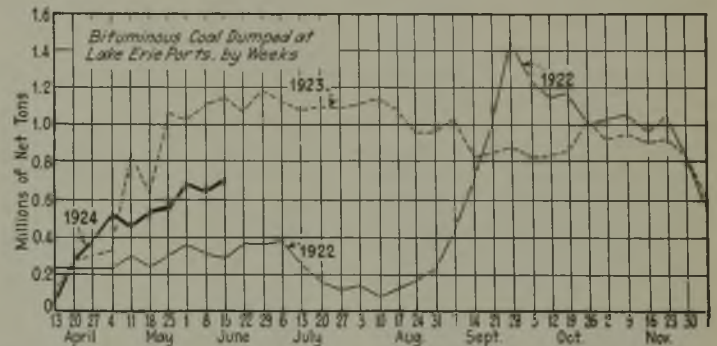
The Navy Department awarded another batch of contracts last week for supplying bituminous coal to navy yards and naval stations during the next fiscal year, beginning July 1. The awards totaled 221,150 tons, being the second lot of contracts let on the basis of proposals opened May 21. The State Department of Purchase of New York also has placed contracts for supplying the coal needs of various state institutions.

Coal Age Index of spot prices of bituminous coal reacted 4 points during the week, standing at 166 on June 16, the corresponding price being \$2.01. This compares with \$2.06 on June 9.

Activity at Hampton Roads continued its downward trend, dumpings of coal for all accounts during the week ended June 12 totaling 265,222 net tons, as com-

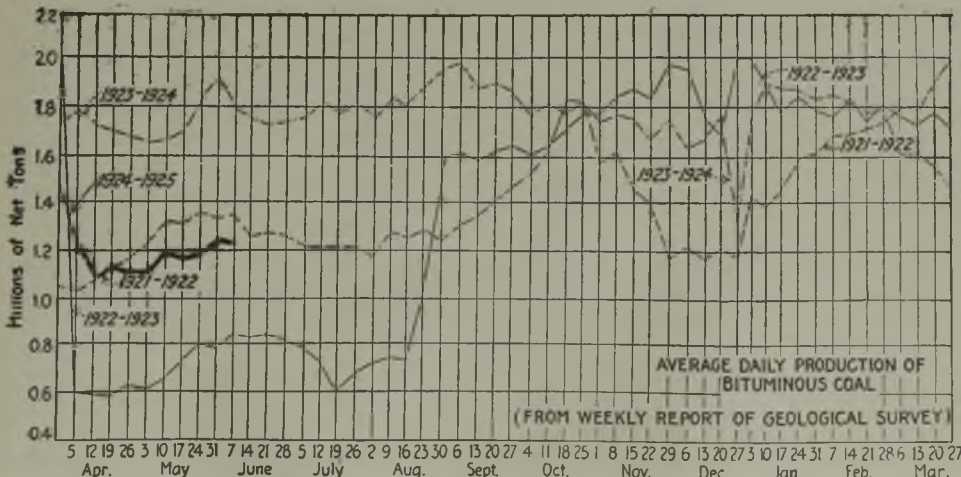
pared with 318,918 tons during the preceding week. Coal dumped at Lake Erie ports during the week ended June 14, according to the Ore & Coal Exchange, was as follows: Cargo, 645,978 net tons; fuel, 39,184 tons. The respective totals during the preceding week were 619,115 tons of cargo coal and 37,198 tons of fuel coal.

There was a slight rebound in the production of bituminous coal following the holiday, the output during the week ended June 7, according to the Geological



Survey, amounting to 7,378,000 net tons, which was 670,000 tons more than was produced during the week ended May 31.

Demand for anthracite continues on its well-oiled path downward since the reaction of a few weeks ago. The slackening of business is in evidence in both steam and domestic sizes. Aided and abetted by local outlaw strikes at a number of the mines of some of the large companies, there has been a corresponding shrinkage in production, which likewise has had a tendency to hold independent prices on an even keel. Ten thousand miners on strike in the Pittston district were joined last Saturday by 700 more from the Underwood colliery of the Pennsylvania Coal Co.



Estimates of Production

(In Net Tons)

BITUMINOUS

	1923	1924
May 24	11,049,000	7,163,000
May 31 (a)	10,091,000	6,708,000
June 7 (b)	10,676,000	7,378,000
Daily average	1,780,000	1,230,000
Cal. yr. to date (c)	239,358,000	204,496,000
Daily av. to date	1,773,000	1,516,000

ANTHRACITE

May 24	1,956,000	1,850,000
May 31	1,606,000	1,294,000
June 7	2,046,000	1,846,000
Cal. yr. to date	45,192,000	40,061,000

COKE

May 31 (a)	395,000	135,000
June 7 (b)	405,000	151,000
Cal. yr. to date (c)	8,799,000	5,698,000

(a) Revised from last report. (b) Subject to revision. (c) Minus one day's production to equalize number of days in the two years.

Little Change in Midwest

The Midwest market droned along during the week without enough change in any particular to have a marked effect. Some sales managers for Illinois producers thought they detected a slight improvement in storage domestic coal such as was hoped for June 1 but which did not materialize then. The domestic market is so flat that a difference of 100 cars a week from the State of Illinois is enough to be noticed. Steam coal was in no demand in spite of the small supply and the prices of last week were hard to maintain against the softening tendency. However, no price changes worthy of note were made, except 15c. off on Indiana screenings and offers of contract southern Illinois screenings at \$1.75 instead of \$1.85, which is the spot market bottom.

The smokeless market edged upward very slightly on prepared sizes, which dealers are beginning to store in small volume. Mine run continues rather soft at \$2. The June 10c. increase in anthracite is pushing a few dealers to buy at once.

Illinois fields appear to be at as low a point as they ever have touched except during a general strike. Few mines among the scattering ones that are running are getting

more than two days a week. A little railroad coal is about all that is moving. The Standard field is suffering along on practically nothing and yet screenings, which have been bringing \$1.60, have been cut down to a flat \$1.50 with not many takers.

There is nothing doing in St. Louis except a little public-school and apartment-house trade. Dealers are not storing anything either in the city or in the country towns nearby, claiming they do not know yet whether their customers are going to lean toward a cheap fuel or high-priced stuff during the coming season. Country steam demand, which had been fair, is no longer felt.

Kentucky Feels Better

Although no Kentucky coal man is cheering about anything, most of the trade feels a little better about the June outlook. A slight pick-up has been felt in industrial demand. Many buyers are beginning to see the bottoms of their respective storage piles and realize that prices can hardly get lower than they are right now. Many Hazard and Elkhorn mines are getting reasonably busy on steel, byproduct, utility and industrial orders as well as on railroad business, which is just beginning to develop. Retailers, however, are not stocking.

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

Table with columns for Market Quoted, June 18 1923, June 2 1924, June 9 1924, June 16 1924, and Midwest. It lists various coal types like Low-Volatile, Eastern, High-Volatile, Eastern, and Midwest, with their respective prices and market locations.

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

Table with columns for Market Quoted, Freight Rates, June 18, 1923 (Independent and Company), June 9, 1924 (Independent and Company), and June 16, 1924 (Independent and Company). It lists anthracite coal types like Broken, Egg, Stove, Chestnut, Range, Pea, and Buckwheat, with their respective prices and market locations.

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

Index	1924		1923	
	June 16	June 9	June 2	June 18
Index	166	170	169	210
Weighted average price	\$2.01	\$2.06	\$2.04	\$2.54

This diagram shows the relative, not the actual prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

The few mines of western Kentucky not affected by the strike find the going pretty hard in view of the union scale most of them are paying, but the volume produced in that end of the state is so much curtailed that the situation is easier for them. Thus far there is no indication of a break in the strike.

In eastern Kentucky the peak price appears to be around \$2.75 for best 4-in. block coal, and in western Kentucky the peak price is around \$2.50 for 6-in. block. Mine run generally is selling at around \$1.35 and up in eastern Kentucky, and from \$1.40 up in western Kentucky, the latter field getting as much for screenings as mine run. In eastern Kentucky screenings start at around 90c. and go to about \$1.25. Egg and nut sizes are in better demand in both fields of the state.

There is a gradual improvement in West Virginia, more noticeable perhaps in the southern than in the northern part of the state. Production in the high-volatile fields is larger, chiefly as a result of additional spot orders, though prices are not advancing. A considerable tonnage is moving to the lakes—not as much as usual perhaps but enough to swell production a little. Output in the Upper Potomac and adjoining regions also has taken a slight spurt.

Northwest Is More Hopeful

A steadying of prices and a slightly better movement to the docks are the only characteristics of the market at the Head-of-the-Lakes. Selling in bituminous is at a standstill, and the only revival in anthracite is a few cars that are going toward the Twin Cities since the slight reduction in rate made by the Interstate Commerce Commission.

Twenty-six boats were unloaded at the Duluth-Superior

docks last week, of which three were hard coal. Receipts for May were as follows: Anthracite, 80,240 tons; bituminous, 591,511 tons, bringing the total for the season to 164,632 for anthracite and 851,529 for bituminous. Anthracite receipts are 41,084 tons and bituminous receipts 796,099 tons less than last year.

A consensus of opinion now is that the changes which the I.C.C. has made in bituminous rates will have no effect at Duluth, as they are too slight to help the market. Anthracite, however, will be strengthened.

At Milwaukee there seems to be a hopeful feeling in coal circles, in spite of the fact that trade is very quiet at present. Conditions in the manufacturing districts must mend, however, before there can be any substantial improvement. The movement of coal by lake is slowing up, and cargo receipts totaling 157,306 tons of anthracite and 357,599 tons of soft coal are subnormal. Last year's totals up to this time were 207,619 and 706,199 tons respectively.

At the Twin Cities active buying is universally dull for the season. The unseasonable weather has had a depressing effect, and the general spirit of hesitation makes steam buyers hold off more than usual. The dock trade anticipates a better business next autumn as a result of the rate decision, and probably will stock somewhat heavier.

Production Gains Steadily in Southwest

There is no heavy activity in the Southwestern district, but a steady increase in production since mines began to reopen following the wage agreement. Production has just about kept pace with demand, so there is little or no price cutting. A little coal is being stored.

Kansas coal quotations have not changed. Arkansas semi-anthracite is \$5.50@6 for lump, with the possibility of an increase next month; \$3.50 for mine run, and screenings are steady at \$2. Henryetta (Okla.) lump is \$5.50; nut, \$3.75; mine run, \$3.50, and screenings, \$2.50.

Very little change was noted in the Colorado coal market during the week. Industries are buying very little and dealers absolutely refuse to place any storage orders yet. Mines worked an average of 23 hours last week and nearly 35 per cent of the working time lost was on account "no market." A slight price advance is anticipated for July 1.

In Utah trade is about dead. Industrial demand is light and dealers are refusing to store a ton, saying that their experience last summer of storing during the hot months only to see the price drop in the autumn is something they can't stand again. There is no contracting worthy of note. However prices are low and have not sunk further.

Cincinnati Market Featureless

Once again the market at Cincinnati is marking time. It is devoid of either discouraging features or the reverse. There has been a bit of a letdown in the Kentucky fields, which has kept the market from clogging to the extent that it could be in any wise called in distress. Lake buyers are still fiddling for position, holding off with a persistence that shows that this movement is in concert. However, egg and 2-in. high-volatile coals command \$1.75@2, which shows the determination of the operators to hold to their stand also. Smokeless jogs along at its recent gait. Orders for lump and egg have been a little slow during the week and bituminous also has slowed up. Slack is weaker because of the strength of prepared, which has caused a larger output of it.

While domestic trade at Columbus is showing a slight improvement, steam business is at a standstill. Little activity is reported in any section and both producers and distributors are playing a waiting game. One of the best features is the amount of school coal that is moving. Utilities are buying to a certain extent and railroad requirements are about normal. Contracting is quiet, as most of the larger users are content to buy on the open market to take advantage of the low prices. A few contracts have been renewed, however, but new ones are not reported.

Lake trade is rather brisk but Ohio mines, especially those in the Hocking Valley, are not sharing in the business.

The situation in the Cleveland trade is practically unchanged. The demand for steam coal is as dead as ever, and nothing has occurred as yet to lift the depression. Manufacturing plants, working part time, are still able to get along on storage fuel, picking up small lots at prices even below the already low spot level.

There is no material change in the general alignment of the Pittsburgh market. Many mines are closed entirely. Demand is coming from only a few quarters. Railroad buying continues to be light, as the roads still seem to have sizable stocks. The steel industry has been a poor buyer, but the decline in steel-mill operations is now nearly over however. There is still no general demand for Pittsburgh district coal for lake shipment. The wage reduction in the Connellsville region has not resulted in any greater steam-coal competition.

Business at Buffalo is slow, in keeping with the condition in most industrial lines.

New England Industry in the Dumps

There are those in the trade who feel that prices are at the low point of the season, but no such optimism has yet spread to possible buyers. The market hereabouts has practically reached the saturation point so far as the more active industries are concerned; the cotton mills with few exceptions are suffering such a depression that no buying is anticipated from that quarter for weeks if not months to come.

Demand inland from rehandling wharves at this end reflects the same kind of market that prevails f.o.b. Hampton Roads. All the factors are carrying heavy stocks, and since they so directly represent the several Pocahontas and New River agencies there is constant pressure to move coal enough to make room for further receipts. The nominal quotation for spot coal f.o.b. Boston is now \$5.75 per gross ton, but the local situation is by no means firmly in hand and moderate shading of this price can be looked for. At retail in Boston there is a similar situation, except that here the actual price is virtually a full dollar a ton less than the \$7.50 per net ton delivered that appears on the printed lists. Prices down to \$6.35 for deliveries through to next April have been almost general in recent weeks, especially on state and municipal business.

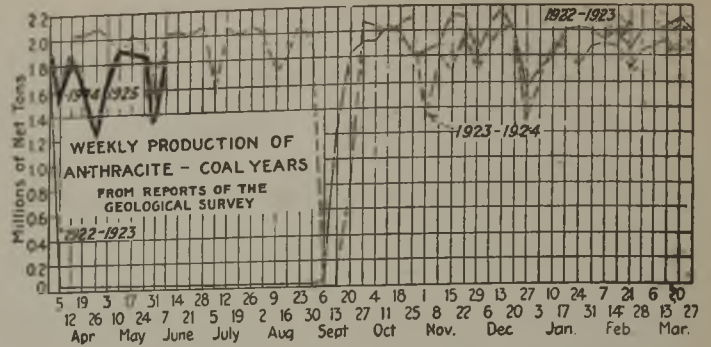
No. 1 Navy standard grades the shippers continue to hold at \$4.40 f.o.b. vessel, although occasional sales are reported at \$4.25. There are almost no comprehensive orders in the market, and a large proportion of what coal is dumped at the three piers is being applied either on coastwise contract or on blocks that were sold off-shore early in the season. No. 2 coals have sold down to \$3.95, but accumulations of this grade are not large and inquiries are relatively few:

All-rail from central Pennsylvania there is no material change. Most producers are either entirely shut down or their mines are working but one or two days a week. Via the Philadelphia and New York piers the tonnage moving is extremely light.

Demand Weak on Atlantic Seaboard

Slow demand as well as slow shipments feature the markets along the Atlantic seaboard. New York buyers continue on a hand-to-mouth diet and no inducement seems strong enough to arouse them from their indifference. Large consumers are satisfied to dig into their reserve stocks, so that about the only spot business transacted nowadays is with the small consumer, who, unfortunately for himself, cannot afford a reserve pile. Business at the New York tidewater depends largely on the position of the buyer and of the shipper. During the last week the daily average number of cars at the various docks ranged around 1,600, but the coal was kept moving and there was no actual hurry about moving it. For that reason prices were firm.

Signs of a revival are still lacking at Philadelphia. Though a turning point is looked for in July there are



some misgivings, as there are rumors that certain branches of the iron trade are likely to take an extended holiday unless orders are forthcoming soon. Industry is not at all encouraging in lines other than iron, although there are a few favorable signs, such as the reopening on a five-day schedule of plants which have been shut down for several weeks. Prices on the spot market remain firm.

Except for a few individual lines, which from time to time report healthy sales, extreme dullness is the keynote at Baltimore. Industries continue to buy for immediate use only in the majority of cases. Prices remain at the same level as for several weeks past. Stagnation has hit the export trade to a surprising extent, involving cancellation of a number of charters which had been expected to bring up the June movement to a considerable figure. Some of the local exporters now have representatives in Europe in connection with the export trade.

Birmingham reports little change in the market. Some interests note a better inquiry and some actual new business taken on, while others are unable to discern any upward trend. It is the consensus of opinion that the lull is due entirely to the industrial slump and that any stimulus in this direction will be promptly reflected in a more active market and increased requirements, as there are no stocks in the hands of consumers.

Anthracite Demand Continues to Slacken

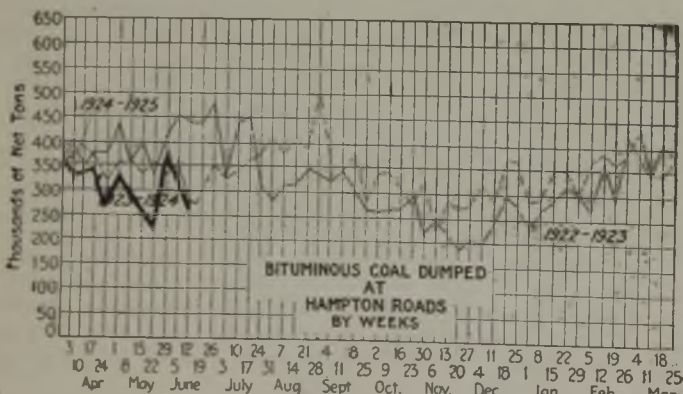
Lack of demand is keeping pace with the cut in production due to labor troubles and holidays at the mines. The situation is slowly but gradually growing easier. Dealers have full yards and consumers are showing no desire to empty them. While it has been an active spring for retail dealers, due in most part to unseasonable weather conditions, buyers do not show any desire to avail themselves of the present prices, although wholesale as well as retail prices are subject to at least a 10c. per ton advance on the first of each month until September. Retail dealers are not anxious for independent coal since they can get sufficient company product to take care of their needs. While the maximum current quotation for independent domestic coals is about \$9.25, straight stove coal brings as high as \$9.75, the lower figure covering mixed orders of egg, stove and chestnut. Pea coal moves quietly and there is comparatively little strength in the buckwheat sizes.

The Philadelphia market continues to soften; were it not for the pressure exerted for stove, and to a lesser degree on egg, there would be nothing of moment in the market whatever. Pea is showing signs of heaviness, as the larger companies are compelled to store it. The steam market is particularly poor, a large surplus going to storage yards.

Baltimore dealers have decided to stick to their original schedule not to raise prices before July 1. Considerable discussion has been raised over an average jump in wholesale prices of between 30 and 35c. per ton. It had originally been planned, on the theory that wholesale prices would increase about 10c. per month from May to September, to absorb this 50c. boost by two advances at retail, one on July 1 of 25c. and one on Sept. 1 of 25c., but dealers may be forced to take an entirely different course.

Car Loadings, Surpluses and Shortages

	Cars Loaded		Surplus Cars		Car Shortage	
	All Cars	Coal Cars	All Cars	Coal Cars		
Week ended May 31, 1924	819,904	120,215	338,526	168,913		
Previous week	918,213	139,083	331,012	170,333		
Week ended June 2, 1923	932,041	171,248	32,443	3,953	16,277	11,392



Foreign Market And Export News

Recovery of British Coal Market Slow; Output Declines Again

Though business in the South Wales market has expanded somewhat, complete recovery of the industry has been impeded by the uncertain labor outlook. There is a fair amount of inquiry but business is very slow. The holdings also have been instrumental in curtailing the volume of orders. Foreign buyers are apprehensive, which no doubt accounts for some of the business going away which normally comes to Britain. Italian and South American purchases are poor, and French and other European inquiries are fitful.

The Newcastle market is weak and dull, though the tone on forward business is better. Some German and Dutch consumers are taking small quantities, but their orders are inconsiderable. The supply is much in excess of the demand and many of the collieries are producing only as much coal as they are likely to sell immediately.

The agreement for the regulation of wages in the British coal-mining industry has been ratified by the miners by a majority of 162,000 in a total vote of 784,000. The agreement is now in force for a period of 12 months; after that it is subject to annulment on one month's notice on either side.

A special cable to *Coal Age* states that British collieries during the week ended May 31 produced 5,308,000 tons, according to the official reports. This compares with 5,436,000 tons during the week ended May 24.

Market Sags at Hampton Roads; Bunkers Alone Hold Up

Business at Hampton Roads is dull, with the market slightly weaker, and with bunker business alone holding its own. Considerable movement to South America on old contracts, which is having no immediate effect on the trade, is one of the features of the situation.

Coastwise business is fair and foreign movement is dropping to a marked degree. Dumpings for the week fell

away still further, and a low record for monthly movement is forecast by shippers. The supply of coal at tide shows some improvement, but it is due to lack of demand more than to any greater movement from the mines. The tone of the market is dull and no immediate improvement is in prospect.

French Market Firmer, Aided by Exchange and Ruhr Turmoil

Due to the pressure of exchange and the labor situation in the Ruhr the position of the French coal market has improved. The demand for industrial coals is better, on account of the curtailment of arrivals from Germany. The situation in house coals, however, is dull, in spite of the attraction of summer rates. The supply of rolling stocks has been satisfactory with the freight rate lower at 21 fr., Bethune-Paris.

Receipts of indemnity fuels by France and Luxemburg between May 1 and 17 were 156,750 tons of coal, 248,000 tons of coke and 15,770 tons of lignite briquets, or a total of 420,600 tons. During the first four months of 1924 the Ruhr sent to France (coke reduced to its equivalent of crude coal on the basis of 3 tons of coke for 4 tons coal) 787,031 tons in January, 888,965 tons in February, 1,028,446 tons in March and 1,371,000 tons in April. The program of the Reparation Commission called for 735,000 tons per month during the first quarter, but the quota for April was only 684,000 tons. The tonnages imposed by the Reparation Commission are getting lower in proportion as the output increases in the French devastated mines.

Fuel imports for April consisted of 2,228,024 tons of coal, 703,446 tons of coke and 54,205 tons of patent fuel. The figures for March were 2,185,954 tons of coal, 491,625 tons of coke and 96,391 tons of patent fuel.

French exports of fuel during April comprised 178,781 tons of coal, 49,711 tons of coke and 8,517 tons of patent fuel, as compared with the following for March: 178,327 tons of coal, 49,412 tons of coke and 18,104 tons of patent fuel.

Export Clearances, Week Ended June 14, 1924

FROM BALTIMORE	
For Martinique:	Tons
Am. Schr. Chas H. MacDowell.....	1,038
For Germany:	
Ger. Str. Porta	709
For Italy:	
Ital. Str. Aquitania	6,488
FROM HAMPTON ROADS	
For Brazil:	
Br. Str. Saint Andrew for Rio de Janeiro	6,979
Br. Str. New Brooklyn for Rio de Janeiro	7,851
Br. Str. Irish Monarch for Rio de Janeiro	5,673
For Canada:	
Du. Str. Peursum for Kingston...	2,034
Amer. Schr. Tolima for St. Stephen..	1,015
Br. Str. Eskbridge for Bridgetown..	4,395
For Dominican Republic:	
Br. Str. Llanberis for Puerto La Plata	5,059
For Italy:	
Ital. Str. City of Para for Venice..	2,169
Ital. Str. Maria Enrica for Porto Ferrajo	10,739
Ital. Str. San Pietro for Portovechio de Piambino	7,219
For Porto Rico:	
Amer. Str. Irene for San Juan.....	4,523
FROM PHILADELPHIA	
For Newfoundland:	
Amer. Schr. M. Taylor for St. Johns.....	72,535
For Cuba:	
Br. Str. Sunpath for Havana.....	

Hampton Roads Pier Situation

	June 7	June 14
N. & W. Piers, Lamberts Pt.:		
Cars on hand.....	930	1,261
Tons on hand.....	56,291	77,329
Tons dumped for week.....	114,356	73,016
Tonnage waiting.....	10,000	15,000
Virginian Piers, Sewalls Pt.:		
Cars on hand.....	779	912
Tons on hand.....	56,100	70,250
Tons dumped for week.....	87,381	72,535
Tonnage waiting.....	10,743	13,419
C. & O. Piers, Newport News:		
Cars on hand.....	1,546	1,405
Tons on hand.....	76,725	72,740
Tons dumped for week.....	83,011	91,255
Tonnage waiting.....	3,975	10,485

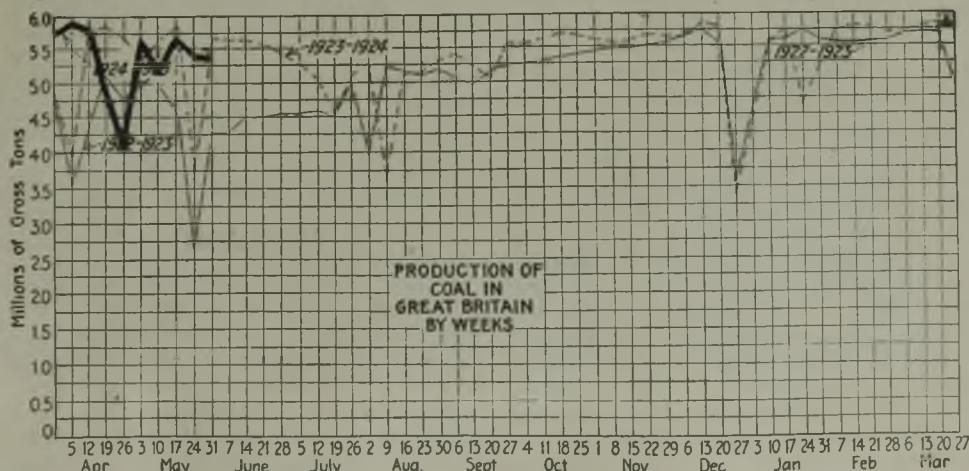
Pier and Bunker Prices, Gross Tons


	PIERS	
	June 7	June 14†
Pool 9, New York.....	\$4.85@5.00	\$4.85@5.00
Pool 10, New York.....	4.60@ 4.75	4.60@ 4.75
Pool 11, New York.....	4.40@ 4.50	4.40@ 4.50
Pool 9, Philadelphia.....	4.70@ 5.05	4.70@ 5.05
Pool 10, Philadelphia.....	4.45@ 4.80	4.45@ 4.80
Pool 11, Philadelphia.....	4.30@ 4.55	4.30@ 4.55
Pool 1, Hamp. Roads.....	4.30@ 4.40	4.35
Pool 2, Hamp. Roads.....	4.25@ 4.30	4.25
Pools 5-6-7 Hamp. Rds...	4.20	4.20
BUNKERS		
Pool 9, New York.....	5.15@ 5.30	5.15@ 5.30
Pool 10, New York.....	4.90@ 5.05	4.90@ 5.05
Pool 11, New York.....	4.70@ 4.80	4.70@ 4.80
Pool 9, Philadelphia.....	5.00@ 5.40	5.00@ 5.40
Pool 10, Philadelphia.....	4.75@ 5.00	4.75@ 5.00
Pool 11, Philadelphia.....	4.50@ 4.80	4.50@ 4.80
Pool 1, Hamp. Roads.....	4.40	4.40
Pool 2, Hamp. Roads.....	4.30	4.25
Pools 5-6-7 Hamp. Rds...	4.20	4.20

Current Quotations British Coal f.o.b. Port, Gross Tons


Quotations by Cable to <i>Coal Age</i>		
	June 7	June 14†
Cardiff:		
Admiralty, large....	27s. 6d. @ 28s. 6d.	27s. 5d. @ 28s.
Steam smalls.....	18s. 6d. @ 19s.	18s. 6d.
Newcastle:		
Best steams.....	25s. 6d. @ 26s. 6d.	22s. 6d. @ 23s. 6d.
Best gas.....	23s. @ 23s. 6d.	23s. @ 23s. 6d.
Best bunkers.....	22s.	20s. @ 21s.

† Advances over previous week shown in heavy type. declines in italics.





News Items From Field and Trade



COLORADO

An electric power plant is soon to be erected at the Pike View mine of the Pike's Peak Consolidated Fuel Co., Colorado Springs, to supply power for the mine and for the Golden Cycle ore-reduction mill in that city, owned by related capital. The mill is now served by the Colorado Springs city electric light plant, which last year sold the mill about 8,000,000 kw.-hr. of current for about \$70,000, which is said to be less than the cost of producing the power. The city company sold the remaining 11,000,000 kw.-hr. of its output to its customers for \$479,000.

IDAHO

Negotiations are still in progress concerning the Teton Coal Co.'s plan to mine coal in the Teton basin. After a long series of hearings and various investigations for the State Public Utilities Commission, a decision is now awaited which may order the Oregon Short Line to operate the 11 miles of abandoned track from Tetonia Junction to the mine sites. The road asserts that the prospective coal traffic out of the mines will not justify the cost of repairing the spur, but H. F. Samuels, politician and president of the coal company, has worked up a great deal of public sentiment in favor of his move to force the road to give his prospective mines service. The road proposed that he put up the money for the repairs. His counter proposal is that he will guarantee to ship 29,920 tons of coal annually and furnish a bond of \$36,910—the estimated cost of opening the line—if the railroad will guarantee certain low freight rates on his coal to certain towns within 125 miles. The case hangs fire.

ILLINOIS

The Illinois Coal Corporation, Chicago, has completed a 200-ft. concrete smokestack at its twin mine at Nason, in Jefferson County and has erected a tipple at one of the shafts. The tipple at the other is expected to be completed early in the autumn.

George A. Harwood, who has been promoted by the New York Central Lines, has resigned the vice-presidency of the Chicago & Harrisburg Coal Co. He has been succeeded by Walter R. Gibbons, real estate and tax agent of the Big Four road, of which the Chicago & Harrisburg Coal Co. is a subsidiary.

What is said to be the largest strip

coal mine in Illinois was recently opened by the United Electric Co. near Lewistown. The mine is on a 2,000 acre tract and equipment has been installed capable of producing 80 carloads of coal per day. The coal is reached 20 to 40 ft. below the surface; powerful shovels take off the top covering of earth while smaller shovels follow up and extract the coal. It is estimated it will require 30 years to remove all of the coal on the land.

INDIANA

Judgment for \$21,236.89 returned Nov. 2, 1923, in the circuit court at Lebanon, in favor of the Black Comet Coal Mining Co. against the Indianapolis Street Railway Co. will stand, it is believed by Indianapolis attorneys, because the proposed appeal to the state Supreme Court was lost for failure to file the necessary papers within the 180 days required by the court rules. It is thought the defendant will be compelled to pay the judgment with interest and costs, amounting to \$22,021.19. The case involved the purchase and delivery of 6,043.2 tons of coal and the judgment is one of the largest returned in the circuit courts of central Indiana for many years.

KENTUCKY

J. T. Dougherty, formerly president of the Jellico Coal & Coke Co., recently became secretary-treasurer of the Harlan Jellico Coal Co., of Louisville.

It was reported from Whitesburg on June 8 that the Ulvah Coal Co., at Bluefield, Lechter County, after being idle for several months, was preparing to resume operations. The company is controlled by West Virginia interests.

The Island Creek Coal Co. has declared an extra dividend of \$1 on the common and the regular quarterly dividends of \$2 on the common and \$1.50 on the preferred stocks, payable July to stock of record June 20.

The men who went on strike at Straight Creek, where several men were recently killed by shooting up the camp, and were ejected from the property of the Liberty Coal & Coke Co. by Judge Cochran, of the U. S. District Court, under injunction proceedings, have all moved to Molus, in Harlan County, the property of the Wallins Creek Collieries Co., of which Mike Roach, of Charleston, W. Va., is president. About 50 families were affected by the injunction proceedings against members of the United Mine Workers. The Molus-Roach plant has been closed

down for some time and will not be able at present to offer work to these men.

The mines of the Jamieson Coal Co., near Idamay, on Sturgeon Creek, above Beattyville, were flooded, company bridges washed out, and two miles of the branch line of the Louisville & Nashville R.R., inundated as a result of a cloudburst in the upper sections of Sturgeon Creek. The damage is estimated at \$300,000 or more, the plant of the Petroleum Carbon Black Co., a West Virginia corporation, having been washed out. Families of miners had to be carried to safety before the crest was reached. For a while wires were down and the town cut off from communication. So far as known no one was injured, and all miners got out of the mines before the plant was flooded.

MARYLAND

Olin D. Robinson has filed a petition in the Circuit Court of Allegany County, praying that the Midland Georges Creek Big Vein Coal Co. be dissolved and a receiver appointed to assume charge of the affairs of the corporation. Robinson asserts that he is a stockholder in the corporation, that it is indebted to him, that the corporation is insolvent and has no money to meet its obligations. The company was organized in 1920, leasing a small tract near Midland, owned by the Consolidation Coal Co. Among other stockholders in the company are Joseph E. Ravenscroft, of McCoole, and George Fletcher, of Frostburg.

MINNESOTA

The Peabody Coal Co., Chicago, has opened an office in Minneapolis, at 614 Plymouth Building, with E. E. Heiner as district sales manager. He formerly was with the Superior Coal & Dock Co.

The summer schedule of a 10c. a month advance on hard coal added that amount on June 1, as has generally been the case each month through the summer. It is a regular custom, but for some reason it caused a little daily press spasm this time.

MISSOURI

Drillers are at work on the King farm, east of Liberty, sinking a test hole for coal and are down at 100 ft. now. It is expected that coal will be found at a depth of about 240

The St. Louis Southwestern Ry. will open bids at noon June 25 at Room 908, Pontiac Building, St. Louis, on from 300,000 to 500,000 net tons of bitu-

minous mine-run coal suitable for locomotive use, to be used as needed. Quotations are to be submitted f.o.b. cars at sellers' mines.

The Coal By-Products Engineering Co. has purchased a 10-acre tract at the intersection of the Tesson Ferry road with the Missouri Pacific R.R. and is erecting a 100-ton smokeless fuel and coal byproduct plant. The plant will produce coal for domestic purposes through a process invented by George Johns, utilizing bituminous and mine fines, lignites and other low-grade fuel. The byproducts recovered, such as gas, oils, tars, creosote, ammonia and sulphate of ammonia, will be sold to the domestic market.

The Mosby Block Coal Co., recently incorporated for \$100,000, has obtained a lease on the Mosby Coal Co., for a period of fifty years for the purpose of mining and selling coal. The coal company under the terms of the contract is to receive 20 per cent of the profits and the Mosby Block Coal Co., the lessee, is to receive 80 per cent of the profits. The last-named company is to make certain permanent improvements for which it will be reimbursed at the termination of the lease with a deduction of 2 per cent per year.

NEW YORK

Marcus L. Bell, vice-president of the Chicago, Rock Island & Pacific R.R., and Frank Burns, president of Burns Brothers, were elected directors of the Coal & Iron National Bank at a meeting of the board held June 11. Mr. Burns succeeds his father, M. F. Burns, deceased.

OHIO

The Southern Ohio Coal Exchange reporting for the week ending May 31 shows a total production of but 58,786 tons out of a full-time capacity of 540,152 tons from 440 mines reporting.

This leaves a shortage of 481,366 tons. Labor shortage was responsible for a loss of 4,740 tons; strikes, 6,280 tons; mine disability, 855 tons and "no market" 459,491. This was a five-day week because of the intervention of Decoration Day. During the same week the eastern Ohio field ordered 8,442 cars and loaded 6,153 cars.

H. S. Brown, who has been manager of the Columbus office of the Philadelphia & Cleveland Coal Co., has been placed in charge of the Indianapolis office, and R. J. Bush, formerly connected with the Cincinnati office, has been named manager to fill the vacancy.

The Morrow-Callahan Coal Co. offices in the Dixie Terminal Building, Cincinnati, have closed. J. D. A. Morrow, who was in charge, will hereafter devote all his attention to his duties as vice-president and general manager of the Joy Machine Co., Pittsburgh, Pa.

The strike of the Cannan Coal Co., Cannanville, is still on and there is a loss of approximately 6,500 tons per week owing to the layoff. Efforts on the part of operators to end the strike have proved futile. The difficulty is over the question of payment for dead work.

The Citizens Trust & Saving Bank, of Columbus, has brought a suit in federal court seeking to establish its claims as a prior lien on properties of the Maynard Coal Co., now in the hands of W. S. Harmon and Frank L. Stein, receivers. The petitioning bank is a trustee under a mortgage deed for a \$1,500,000 bond issue, of which \$680,000 is outstanding. This is secured by a mortgage on the coal properties and 5,500 shares of stock of the Superior Coal & Dock Co., a subsidiary.

Governor Donahey has written a letter to John E. Harper, Director of Public Welfare, which department has charge of the operation of 23 state institutions, urging him to lay in the winter's supply of fuel now in order to help the mining situation in the Hock-

ing Valley. The annual consumption of coal at the various state institutions is about 150,000 tons, mostly mine run and screenings. It is believed that by purchasing now funds available after July 1 can be used to pay for the coal.

The Rice Coal Co., of Dayton, announces the appointment of Earl Wertz as northern sales agent, with headquarters at 839 Ohio Bldg., Toledo. Mr. Wertz will have charge of the distribution of the output of the company's mines in addition to which has been added the output of the Keel Coal Co. at Pauley, Ky., and the Columbia Coal Co.

PENNSYLVANIA

Thin-vein mining is more in evidence in the Hazleton region. The big measures have been worked for from fifty to seventy-five years, and it has been found advisable to take the coal out of the smaller strata.

The Lehigh & Wilkes-Barre Coal Co. has declared a dividend at the rate of 7 per cent a year on the preferred stock or 1½ per cent for the period from April 1 to June 1, and a dividend of \$3 a share on the common stock, payable June 2 to stock of record May 20.

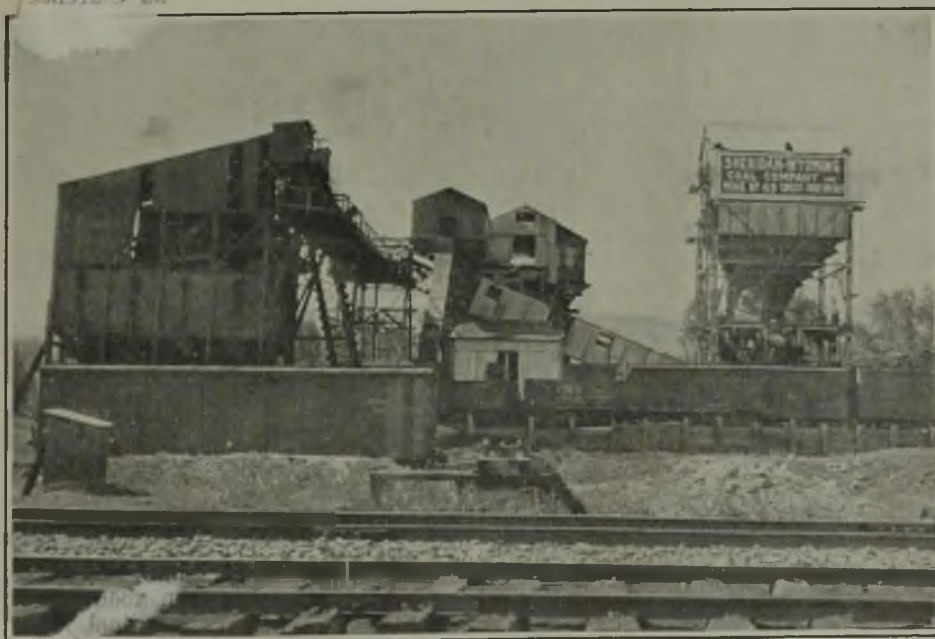
The mines of the Cascade Coal & Coke Co., at Sykesville, controlled by Rogers, Brown & Co., have been closed because the union miners refused to work at reduced wages. It is expected that the company's mines at Tyler, in the same vicinity, will close soon for the same reason.

The oft-repeated statement that the coal supply of the country will give out within a hundred years has been sharply challenged by the engineers of the Lehigh Coal & Navigation Co., who are preparing plans for extensive stripping operations in the Panther Creek Valley near Lansford.

Work has been started on the removal of coal from the new stripping of the Wolf Coal Co. on the Beisel tract, between Drifton and Lattimer. Coal measures were exposed a week ago. The coal is being prepared at the Drifton breaker. The tonnage is shipped over the Lehigh Valley railroad.

Mayor E. J. Healey, of Carbondale, last week ordered Anthony Pinaro, a contractor, to cease operations in three veins surrounding a mine fire in that city. The contractor was removing the coal from the surface and was filling in with dirt in an effort to check the mine fire. Residents of the vicinity complained to the Mayor that the operation was a menace to their health and property. The situation is being investigated by the City Council and mining engineers.

The Lehigh Valley Coal Co., recently segregated from the Lehigh Valley R.R., reports net income of \$6,449,516 for 1923. After allowing for all interest charges, including interest on the new 5 per cent bonds, and allowing for federal tax reserves, the company reports a balance of \$4,495,064, or \$3.70 a share on the 1,212,000 shares of capital stock sold to stockholders of the Lehigh Valley R.R. No dividend has been declared by the coal company



Tipple of Sheridan-Wyoming Coal Co., Carney, Wyo.

This property formerly belonged to the Carney Coal Co. and is one of the leading mines in the north of the state.

since its segregation from the railroad property, but it is reported that a dividend of at least \$2 a share annually is expected on the stock before the end of this year.

The Pennsylvania Coal Co. made the following changes at three of the company's largest collieries June 1, according to an announcement by J. P. Jennings, general superintendent of the Pittston district; Superintendent James C. Johnson, transferred from the Butler colliery, Pittston, to the Central colliery, Avoca; Superintendent T. H. O'Brien, of Avoca, from the Central colliery to No. 9 colliery, Pittston, and Superintendent Thomas Huntley, of Pittston, from No. 9 colliery to the Butler colliery, at Pittston.

A controversy at Mine No. 5 of the Portage Coal Mining Co., at Portage, Cambria County, which resulted in a strike on Feb. 2, involving 450 men, has been settled, the men agreeing to return to work on the terms proposed by the company at the time the strike was called. The strike was against the wishes of the United Mine Workers officials. The vein mined in this operation contains about 1 ft. of inferior coal, known as "rooster" coal. This the company ordered not shot down and the miners went on a strike, alleging that the order reduced their earning capacity.

Fatal mine accidents showed a 16 per cent falling off in the first five months of this year, according to Secretary of Mines Joseph J. Walsh. Whereas 410 miners lost their lives in mine accidents in Pennsylvania during the first five months of 1923, the number of fatalities in the similar period in 1924 totals 343, a decrease of 67 deaths. "In the anthracite region," Secretary Walsh stated, "there were 237 fatal accidents in the first five months of 1923, as compared with 198 in the same period of 1924. "In the bituminous region there were 173 fatal accidents as compared with 145 in the same five months of 1924."

WASHINGTON

The Black Carbon Coal Co. is approaching the operating point with its property near Buckley, which is aimed to be a 300-ton mine. The company has bought the properties once operated as the Spiketown, Morristown and Pittsburgh mines. The officers of the company are Fraser H. Lantz, general manager; James Kelley, assistant general manager; David Grey, superintendent and engineer; James C. McCracken, secretary-treasurer and in charge of the Seattle office.

WEST VIRGINIA

There is more activity in the New River field now that the Loop Creek mines are running on a full-time basis, including the McKell Coal & Coke Co. mines and the Sun and Price Hill mines.

The Huntington Coal Sales Co., of Huntington, has filed articles of dissolution in the office of the Secretary of State and will discontinue its corporate existence. The New Pocahontas Coal

Co., of Huntington, also has filed a certificate of dissolution.

In connection with the suit of the Shrewsbury Coal Company for \$75,000 damage for alleged failure to take coal under contract, brought against the Hooper-Mankin Fuel Co., of Huntington, the Circuit Court of Kanawha County after presentation of evidence in the case, directed a verdict in favor of the defendant.

A deed recorded in the office of the County Clerk of Monongalia County shows the sale by the W. A. Stone Fuel Co. of about 342 acres of land with underlying coal in Union district of Monongalia County. The estimated consideration was \$50,000. The Morris, Stewart and Colebank tracts are involved. The coal is in the Pittsburgh seam.

The Benwood explosion on April 28, in which 119 miners were killed, made the list of casualties in West Virginia mines during April unusually large, 141 men having perished in the mines of the state during that month. One hundred and nineteen deaths occurred in Marshall County, five in Raleigh County, 3 in Fayette County, 4 in Logan County, 2 in Greenbrier County, and one each in Clay, Kanawha, Marion, McDowell, Mercer, Ohio, Preston and Tucker County. Aside from the large toll in the Benwood disaster there were 22 fatalities, 16 of which resulted from a fall of slate, other deaths being due to miscellaneous causes.

WISCONSIN

Affairs of the defunct Valley Coal & Dock Co., of Milwaukee, are being investigated by a federal grand jury. It is charged that a Milwaukee man interested in the company obtained large credit for the concern on false representations.

CANADA

The Clear Mountain Coal Co., which is said to be investing \$300,000 in developing Lillooet sub-bituminous coal near Ashcroft, B. C., is now putting that coal on the Vancouver market, hauling it by rail from upper Hat Creek to Squamish and by water to Vancouver.

The Pacific Coast Coal Mines, which formerly operated the Morden mine, near South Wellington, B. C., which has been in liquidation, is being re-organized and is expected to resume operations next autumn. The company also owns a coal concession at Hequash, near Alert Bay, where some development work has been done.

In the first-aid competitions both for the British Columbia championship (Senior) and the Wallace Nesbitt Cup (Junior), held under the auspices of the St. Johns Ambulance Association, the Nanaimo "A" team (Western Fuel Corporation of Canada) scored the highest number of points among the seniors, with 268 out of a possible 325, the juniors of the same corporation obtaining first place in their class with 185½ points. The latter were given a close run by the Fernie 4th Troop of

Boy Scouts with 175 out of a possible 250.

Striking miners in the Drumheller district of Alberta received their first relief from the international organization at Indianapolis on June 6. It was distributed in the form of orders for groceries and clothing, single men receiving \$2 per week and married men \$4 a week with 50c. additional for each child. The stand taken by President John L. Lewis and the International officers is that relief will be given only when cases are considered needy.

The Pacific Coast Coal Mines, Ltd., at one time one of the big producing coal operators of Vancouver Island, is to resume work within a few months. The company acquired a large acreage near South Wellington which was developed during 1909, 1910, 1911 and 1912 until it was mining about 215,000 tons a year. In 1911 New York interests gained control but litigation finally led to the sale of the property by the Sheriff of Nanaimo in 1922. The property then was bought in by some of those most largely interested financially. Since that time the mine has been idle. It may be said, as to the present holdings, that the Morden Mine, which is located on the 1,500 acre block, South Wellington, possesses the most modern colliery plant on the Pacific Coast. This mine is connected to the shipping point at Boat Harbor, east coast of Vancouver Island, about five and a half miles from the mine, with a standard-gauge railroad and is provided with all necessary rolling stock. At tidewater there are shipping wharves, bunkers, washeries and loading conveyors.

Association Activities

A general meeting of the Smokeless Coal Operators' Association has been called by the president, Robert H. Gross, to be held Thursday morning, July 12, at the Hotel Washington, Washington, D. C.

The "Shop Talk" meeting of the Fayette-Greene Coal Producers Association, on Wednesday evening, June 11, at the Summit Hotel, near Uniontown, Pa., brought out about 100 coal and coke company officers, superintendents, master mechanics and mine foremen. After an enjoyable repast, G. Carl Areford, President of the association, introduced William Z. Price, assistant general superintendent of the Buckeye Coal Co., of Nemaquin, Greene Co., who presided. The principal topic of the evening was rock dusting, and the first speaker of the evening, Captain Edward Steidle, of Pittsburgh, Pa., in charge of the short mining course at the Carnegie Institute of Technology, read a very comprehensive paper on the subject. He was followed by A. C. Fieldner, superintendent of the U. S. Bureau of Mines station at Pittsburgh, who also spoke on the same subject. State Mine Inspectors Edward E. Girod, of Masontown, and Richard Maize, of Uniontown, also took part in the short discussion. Edward H. Cox, general manager of the Snowdon Coke Co., of Brownsville, gave a talk on machine loading, and was followed by Frank W. Newhall, of Uniontown, chief engineer of the Republic Iron & Steel Co.'s coal and coke plants, who made a few remarks on the same subject. Clyde Elkins, of Connellsville, inspector for the State Compensation Insurance Fund, read a paper on mine safety. M. D. Cooper, of Pittsburgh, assistant general superintendent of the Hillman Coal & Coke Co. and president of the Coal Mining Institute of America, spoke briefly on the topics of the evening and called attention to the next annual session of the Institute to be held next December, at which rock dusting is to be one of the chief topics of discussion.

Traffic News

Commerce Commission Approves Clinchfield Lease

The Interstate Commerce Commission on June 12 approved the applications of the Atlantic Coast Line and the Louisville & Nashville R.R. for joint control of the Clinchfield Ry. system. The commission approved the lease under certain conditions, which were submitted to those interested in the Clinchfield properties on Feb. 9 last, but protested against by the applicants. Opposition to the granting of the application also was voiced by the Seaboard Air Line and other carriers.

The commission also granted the applicants authority to assume, as lessees, obligation of paying as rental for the property rights and franchises of the Carolina, Clinchfield & Ohio Ry. and its subsidiaries amounts equivalent to dividends at certain rates upon \$25,000,000 of common capital stock and interest upon certain bonds and equipment obligations of the Clinchfield in the amount of \$28,292,000 now outstanding and, the commission said, as guaranteed by the lessor of the property upon \$1,500,000 of Holston Corporation 5 per cent realty and collateral trust convertible notes.

Indiana Rate Cut Deferred

The recent order of the Indiana Public Service Commission reducing intrastate coal freight rates will not become effective until July 1, an agreement having been reached between attorneys of the commission and attorneys for 21 railroads that brought suit in the Superior Court before Judge Linn D. Hay, to have the order of the commission set aside. The order was originally intended to go into effect April 1, but the date was postponed from time to time until after the hearing. Judge Hay said that the case will not be decided before the latter part of June.

Obituary

Joseph Shelly Sillyman died last week in Philadelphia, of a complication of diseases. He was born at Pottsville, Pa., on May 5, 1847. After graduation from the academy in that city he followed the profession of civil and mining engineer in Pottsville and Hazleton, Pa., being one of the best known engineers in central Pennsylvania, widely recognized as an expert in mineral lands and mining. The practice of his profession took him into nearly all parts of the bituminous-coal fields in Pennsylvania, West Virginia and eastern Kentucky.

Donald McDonald, Sr., vice-president and general manager of the Louisville Gas & Electric Co., a Byllesby subsidiary, died suddenly June 3 following a stroke of apoplexy at the completion of a talk June 3, before the Electric Club, Louisville. He had just made a strong

address in favor of passage of a \$75,000,000 bond issue for roads and schools in the fall elections, under an enabling act passed by the recent Legislature. The Louisville Gas & Electric Co. owns its own coal mines at Echols, in Western Kentucky and has a fleet of battleship hopper cars, used for transporting its fuel to Louisville during periods of car shortage.

Will O. Davis, 62 years of age, secretary-treasurer of the Kentucky River Coal Co., Lexington, Ky., and prominent lawyer, died at his home at Versailles, Ky., a few days ago of apoplexy, having become ill while in Louisville two weeks prior to his death. He had recently been named state manager for Oscar W. Underwood, Democratic candidate for President, who was his old classmate at college.

David C. Thomas, of Columbus, Ohio, a retired coal operator, was instantly killed recently by falling from the 15th floor of the building at 8 E. Broad St. in that city. He was for many years head of the D. C. Thomas Coal Co., with main offices in Columbus. He sold out in 1919 to the Hisylvania Coal Co. and retired from active business, although nominally vice-president of the Piney Fork Coal Co. and the Panhandle Collieries Co., for which the Hisylvania is selling agent. He is survived by his wife, a son and five daughters.

Publications Received

Analyses of Ohio Coals. Bureau of Mines, Washington, D. C. Technical paper 344. Pp. 39; 6x9 in.; tables.

An Investigation of the Maximum Temperatures and Pressures Attainable in the Combustion of Gaseous and Liquid Fuels. by G. A. Goodenough and G. T. Felbeck. Engineering Experiment Station, University of Illinois, Urbana, Ill. Bulletin 139. Pp. 160; 6x9 in.; illustrated.

First General Report of the Lignite Utilization Board of Canada, Montreal, Canada. Pp. 263; 6x9 in.; illustrated. This complete and well illustrated report covers operations from Oct. 1, 1918, to Jan. 1, 1924.

Report on the Mines of Province of Nova Scotia for 1923. Department of Public Works and Mines, Halifax, N. S. Pp. 215; 6x9 in.; tables.

Mechanical Engineers' Handbook. New second edition, by Lionel S. Marks. Pp. 2,000; 4½x7 in.; illustrated. Price \$6. All material in this book has been brought up to date and much new matter included. McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York City.

Coming Meetings

American Society for Testing Materials; annual meeting, Chalfonte Hotel, Atlantic City, N. J., June 23-27. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

American Institute of Electrical Engineers, annual convention, June 23-27, Edgewater Beach, Chicago, Ill. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

First International Management Congress, Prague, Czechoslovakia, July 21-24.

World Power Conference, Wembley, London, England, June 30-July 12. O. C. Merrill, Federal Power Commission, Washington, D. C.

Rocky Mountain Coal Mining Institute. Summer meeting, Aug. 7-9, Rock Springs, Wyo. Secretary, Benedict Shubart, 521 Boston Bldg., Denver, Colo.

New Equipment

Temperature Indicator for Transformers

W. D. Crumpton & Co., 8 Bridge Street, New York, sole distributors for the Packard Electric Company, Ltd., St. Catherines, Ontario, Can., recently



Instrument Tells Amount of Load

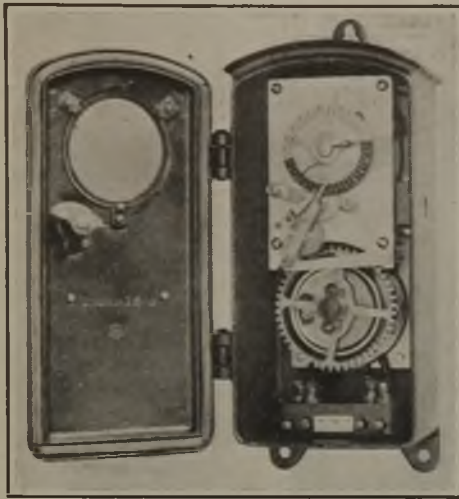
The safe loading of a transformer is a function of the temperature. This device records the temperature of the oil and thus gives a visual indication of the load.

placed on the market the Baker transformer temperature signal. This device is operated by a thermostat which moves a rod to which is mounted a drum, thus indicating the temperature of the transformer at all times. Part of the device consists of a maximum high temperature indicator which records at all times the highest temperature obtained by the transformer oil. The maximum high temperature drum is colored red and white. Red denoting overload, white denoting safe load. A white and black disc indicates underload. Temperature indications are shown against large figures which can be readily observed from the street level through a glass window in the head of the instrument. The materials used in the construction of this device are non-corrosive metals, all parts are sealed so as not to leak water or any vapor. The standard size stems are 7 in., 9 in. and 12 in., but any other length can be made to order.

Switch Timed by Synchronous Motor

For the control of circuits of moderate rating, a new automatic time switch, has been developed by the General Electric Co. The principal feature of the new device is the adoption of a Warren synchronous motor in place of the conventional spring-driven clock commonly employed to operate the timing mechanism. The new switch is for use on alternating-current circuits.

The function of this device is the same as that of the many other forms of time switches now on the market. It differs markedly from these other types, however, in that its time-keeping and propelling member is in the form of a small synchronous motor instead of the usual clock with escapement mechanism and spring. Control is effected by automatically closing and



Automatic Time Switch

The timing mechanism of this device is driven by a synchronous motor, thus the usual clock attachment is not necessary and no winding is required. Operations which must start and stop at definite periods can now be accomplished with regularity.

later opening the circuit at any predetermined time for which the switch may be set. It is especially adapted for use with electrically driven pumps, compressors, motor-generator sets, battery charging apparatus, lighting systems, etc.

The new switch, is about 12 in. high, 5 in. wide and about 4 in. deep. It is enclosed in a weatherproof case, thus being adapted for outdoor mounting as well as for mine service. It is rated 20 amperes, double-pole, single-throw, for use on circuits not exceeding 250 volts.

Mine Car Is Equipped with One-Piece Drop Bottom

One of the points where cars are frequently delayed longer than necessary is at the tippable dump. Naturally

if cars must be uncoupled, discharged one at a time and then coupled together again the entire process consumes much time and also requires the services of several men. If cars can be dumped consecutively without being detached from each other, simply by being drawn along by some mechanical means, not only would the time of dumping be reduced but the operation would be simplified and the cost lowered.

To attain this end P. W. Holstein has invented and placed on the market the drop-bottom car shown in the accompanying illustration. As may be seen the drawbar extends through and is attached to the car box only. The wooden bottom, to which the running gears are, of course, fastened, is securely hinged to the car box at the forward end. Angle-iron guides along the sides of the bottom assure that the two parts will return to proper position after they have swung apart in dumping. Along the top of the car box also is a wide angle-iron stiffener or gunwale.

The dump upon which this car discharges is likewise of simple type. It consists merely of a suitable depression in the track over a pit or bin for receiving the coal and a pair of chains upon either side. These chains engage the gunwales of the cars and support the car box as it moves across the dump. The bottom of the car on the other hand is supported by the car box at the hinged end and by the rear wheels at the other. As the rear wheels therefore take the depression in the track the bottom of the car swings open discharging the contents but returns to normal position as the rails again rise to their proper level relative to the chains.

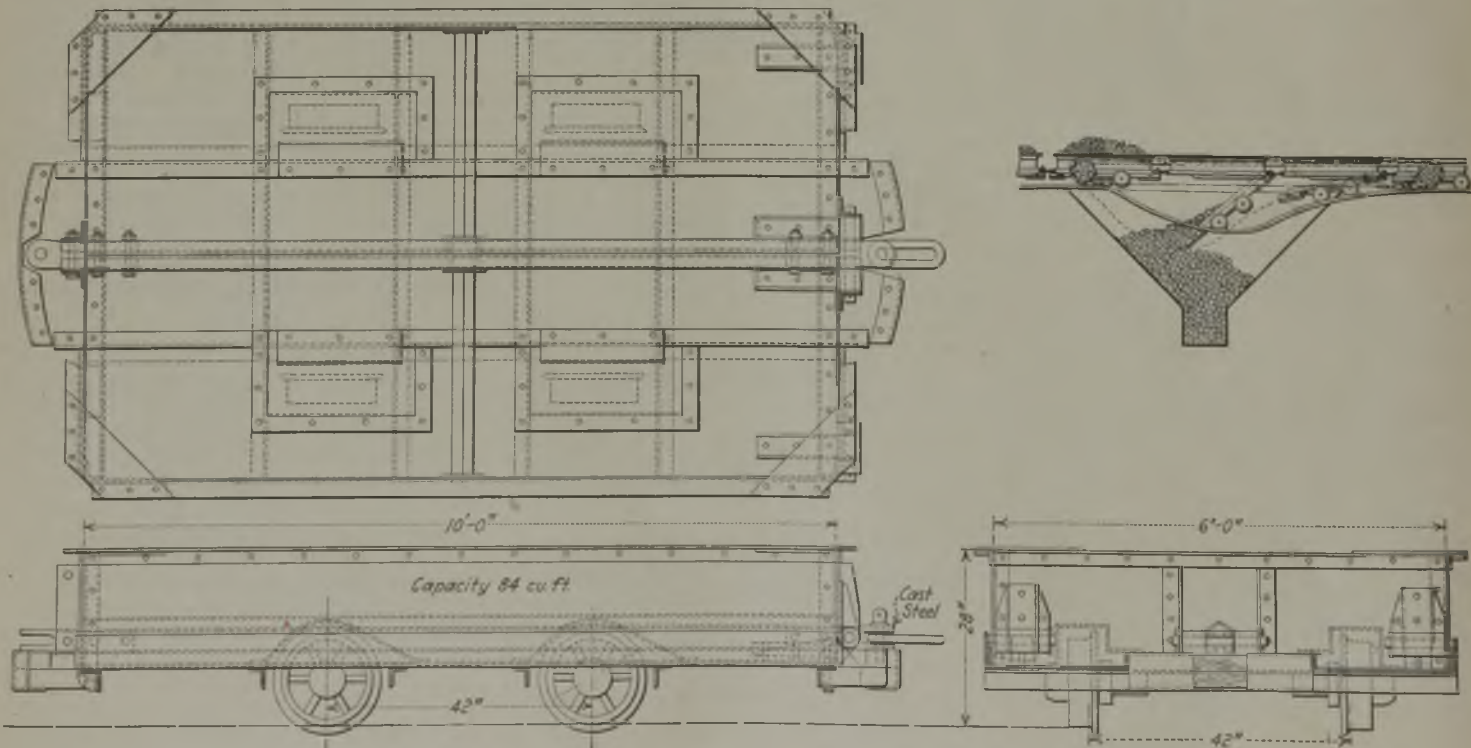
Any number of cars may be discharged by this dump without stopping or uncoupling from each other. A dump of this variety has been in operation at a Kentucky mine for over two years

and has given entire satisfaction. The cars employed at this operation, however, are of a slightly different model, lacking the through drawbar and being fitted with lugs instead of the gunwale. The differences, however, are not so pronounced as to cause any particular variation in their operation.

Flow Meter With New Integrating Unit

The Cochrane Corporation of Philadelphia has recently added an integrating device to its new type flow meter used for measuring water and steam in pipe lines. It is claimed that this additional device imposes no load or resistance to the operation of the meter and as a consequence the sensitivity and accuracy of the meter is not impaired.

The integrator is driven by a clock, the deflecting member of the meter merely controlling the position of a stop or motion-limiting pin. Its operation is similar in principle to the method used by steam engineers for obtaining the mean effective pressure from an engine indicator card, which consists in ruling evenly spaced parallel lines across the chart, adding up the lengths of the lines intercepted between the indicator lines and then dividing by the total number of lines which have been added. The indicator goes through motions equivalent to drawing a line from zero to the pen trace on the flow-meter chart once each minute, the length of this line being proportional to the momentary rate of flow and the sum of the lines proportional to the total flow for a definite period. The integrator can easily be calibrated and is said to give results within 1 per cent of absolute accuracy in a run during which the flow varies between 20 per cent and 100 per cent of full-load rating.



Details of New Drop-Bottom Car and Elevation of Its Dump

The bottom of this car is hinged to the body at one end. On the dump the car body is supported by two chains, one upon either side, while the rear wheels follow the rails. The bottom thus swings open and then closes again in the manner shown.