COAL AGE

Devoted to the Operating, Technical and Business Problems of the Coal Mining Industry

McGRAW-HILL PUBLISHING COMPANY, INC.
JAMES H. McGRAW, *Chairman of the Board*
MALCOLM MUIR, *President*
H. C. PARMELEE, *Editorial Director*

SYDNEY A. HALE
Managing Editor

H. W. CLARKE
Publishing Director

Volume 34 NEW YORK, APRIL, 1929 *Number 4*

Economics and the Law

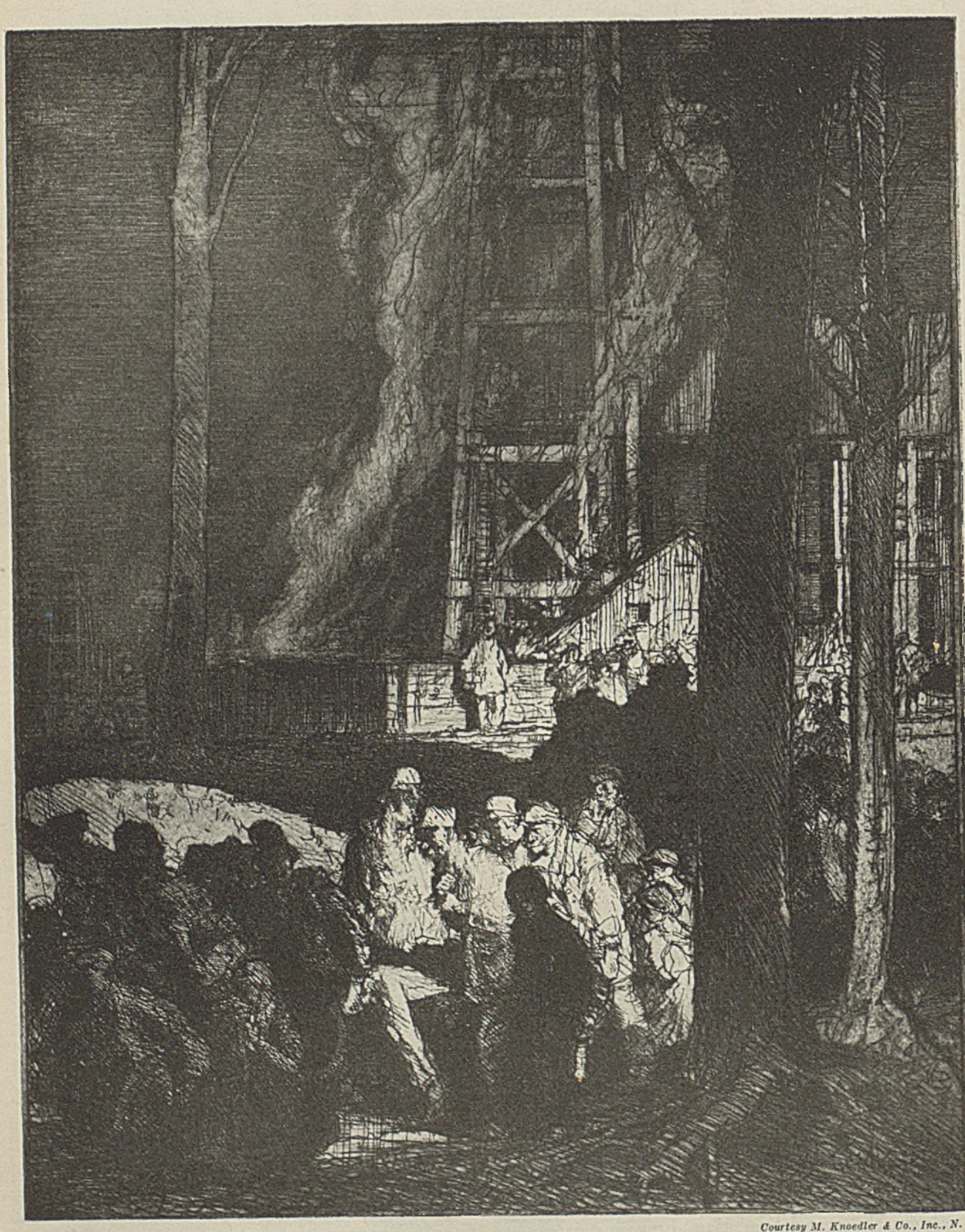
REFUSAL of the Department of Justice to put the stamp of approval upon a proposed agreement of the petroleum interests of the country to restrict oil production is a dramatic illustration of the clash between antiquated law and living, modern economics. In view of the sweeping character of the Sherman act, the unwillingness of Attorney General Mitchell to sanction an arrangement which seems to run counter to the language of that statute is hardly surprising.

WHILE IT IS TRUE that certain decisions of the Supreme Court involving combinations have softened the harshness of the law by reading into it the so-called "rule of reason," this ameliorating doctrine has not been extended to blanket associated activities where the participants were not physically or financially merged. Despite the clarification given by pronouncements in several actions against trade groups, the twilight zone still shadows a broad belt of co-operative effort and creates doubt as to the legality of many proposals which are economically sound. The nation as a whole no longer fears big business merely because of its bigness, but the dread of forty years ago is embalmed in the law.

THE REFUSAL of the Attorney General to indorse the restriction plan, however, is not without its compensating features. For one thing it has served to sharply refocus public attention upon the inadequacy of the Sherman act as it now stands to meet present-day necessities of the business world. That interest will be heightened whether the oil men follow their announced intention of going through with their program or whether the publication of Mr. Mitchell's views leads to the abandonment of that plan. Whichever happens the case of those urging modification of the law will be measurably strengthened.

ANOTHER GAIN has been the injection of the suggestion that the government could not sanction approval of restriction in production without taking over control of prices and the intimation that Washington is opposed to an extension of government price fixing. Knowledge of such opposition is most welcome. Emphasis upon the fact that discussion of co-operative production control must inevitably lead to consideration of government price control is most timely. Must the price of legal relief from one economic burden be the imposition of another?

WHATEVER the immediate outcome of this latest clash, in the long run the public will have a clearer picture of the conflict between the words of the statutes and the demands of economics. No industry has a greater stake in the movement for a modification of oppressive regulation such as lurks in the Sherman act than the coal industry. It knows to its financial sorrow the economic dangers inherent in uncontrolled production. No industry, therefore, can profit more by a better public understanding of just what this clash means to essential productive groups and to the national welfare.



Courtesy M. Knoedler & Co., Inc., N. Y.

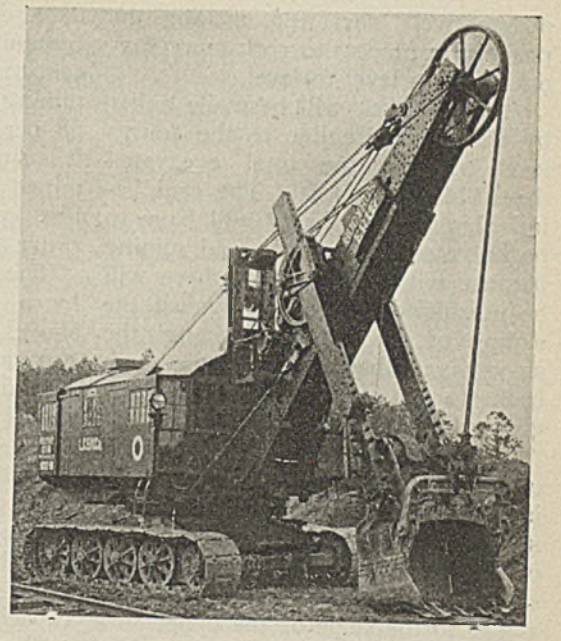
The Coal Mine

From an etching by
Frank Brangwyn

Three-Million Yard

STRIPPING

Uncovers Big Anthracite Bed



By Ivan A. Given
Editorial Staff, Coal Age

IN strippings with heavy cover, cars and locomotives must be used to remove the overburden to a distant dumping point. The terrain in the anthracite region is so rugged and the measures dip so steeply that such heavy cover strippings are inevitable if the coal is to be removed with the aid of the strip shovel. At the same time the advantages afforded by such shovels are so great with thick coal that even with deep cover and long surface hauls to dumping points the practice of stripping is rapidly growing in response to improvements in technique.

In all areas where the cover was light the coal was removed long ago, mostly by more or less primitive stripping methods. Horses and mules with small "buggies" or cars provided in earlier days for the transportation of the material. Later came small stripping shovels with dinkey locomotives and with cars about the size of those used underground. As a result of these activities the only strippable areas which now remain are under heavy cover.

About the largest proposition is one of the Lehigh Coal & Navigation Co., Summit Hill, Pa., in the Mammoth seam. Here the cover will ultimately reach 200 ft. The thickness of the coal is about 50 to 55 ft. Over on the south side of the basin the coal turns up on end and there it will measure 400 ft. vertically, due partly to the uptilt of the coal and partly apparently to an inequality in the folding of the cap rock and footwall that has made an open space into which the coal appears to have been squeezed while still plastic. This coal did not come certainly from the part of the seam now in place, for that has nowhere suffered any diminution. Some may, however, have flowed down from the anticline, which having been entirely eroded, can no longer give mute testimony to what actually happened.

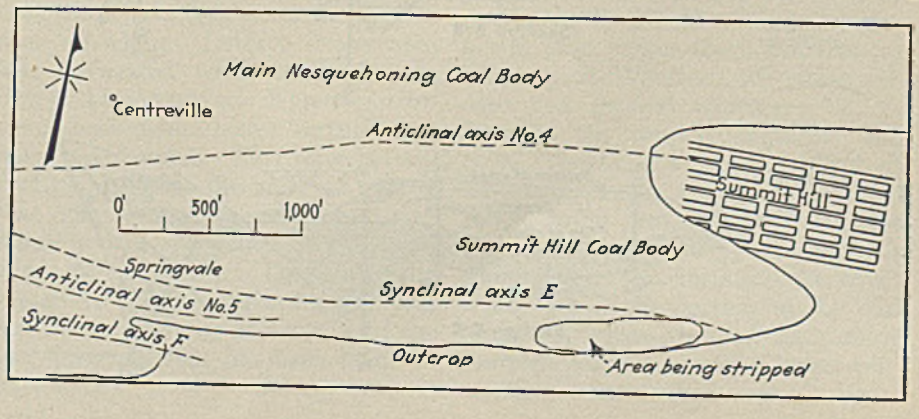
THE entire work, which has been termed by the engineers of the company "the major operation," would require several years of expensive excavation and many big shovels before the coal would be available all over the basin. To obtain this 7,000,000 cu.yd. of coal no less than 20,000,000 cu.yd. of material would have to be stripped, loaded and carried away to the dump. For this reason only the work at the south side of the basin is contemplated at present. There the coal is thickest and tilts up vertically, and is covered with only 25 ft. of alluvial or slidden material.

But to expose even this part of the coal is a task of mammoth proportions, for the ground rises away from the basin and, in order to prevent the footwall of the vertical coal seam from sliding, a long slope must be excavated in high ground, a slope that will not only protect the cut when it reaches the top of the coal but also will protect it when excavated to the depth planned.

This will involve the excavation from over the pitching coal and from either side of it of 1,600,000 cu.yd. of earth and rock. As the coal has been partly mined already by breasts which have caved and fallen in, another 300,000 cu.yd. will have to be removed from these, making 1,900,000 cu.yd. in all.

The first cut will remove from 25 to 70 ft. of over-burden. The area with a 70-ft. cut, however, will be strictly limited, and this is fortunate, for this depth is a little greater than can be removed at one time with maximum efficiency. The second and third cuts each will lower the level of the excavation 40 ft., but this work will be greatly sweetened by the fact that a large portion of each cut will be in coal. The width of the excavation also will be becoming

Summit Hill Coal Body Stands Out Like Stubby Finger From Main Body of Nesquehoning Field



progressively narrower, making the proportion of coal to rock more favorable from level to level.

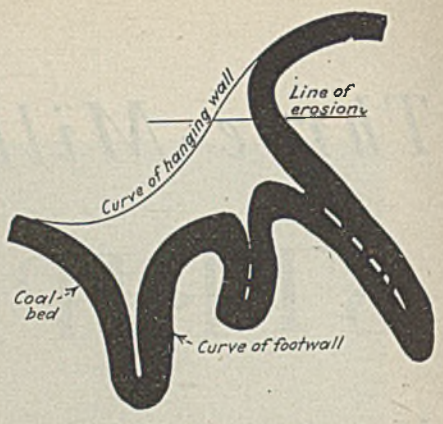
A further cut will be made either by shovel or dragline to the fourth level, making the total excavated depth 140 to 190 ft. The coal below this level probably will have to be operated by underground mining because with an open pit there will be insufficient protection against the sliding of the hill and because the slope has not been carried far enough back to give protection for any greater depth.

The thickness of the coal has been carefully tested by diamond drilling and plotted. Some of the cross-sections accompany this article. Most of the holes were drilled vertically but some have been directed at right angles to the slope of the upper surface of the seam—putatively, at right angles to the lie of the bed. However, as has been said, the coal at this point probably is no longer in the blanket formation in which it was first laid down, so to talk of it as a "bed" and to discuss its lie may be misleading.

It has been found that in the east end of the mine, which at an early date removed part of the coal in the Summit Hill area, only about 40 per cent of the coal was removed by first mining and on the west end only 38 per cent. From what is known it is surmised that the area now being mined was for several reasons, even less completely extracted and will prove abundantly productive.

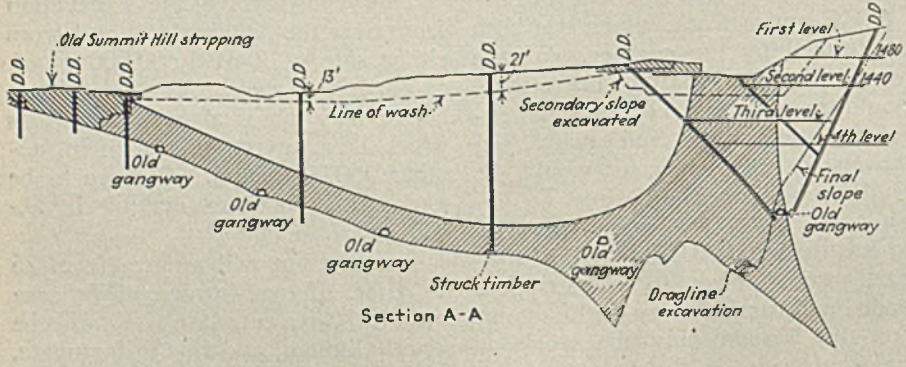
The overburden is being removed by a 120-B Bucyrus-Erie 4-cu.yd. shovel mounted on caterpillars, which excavates a berm about 66 ft. wide. The alternating current by which the shovel is operated has a potential of 2,300 volts and is taken into an induction motor driving a direct-current generator. A Ward-Leonard control smooths out the peaks. The shovel discharges into standard-gage Clark side-dump cars of 30-cu.yd. capacity.

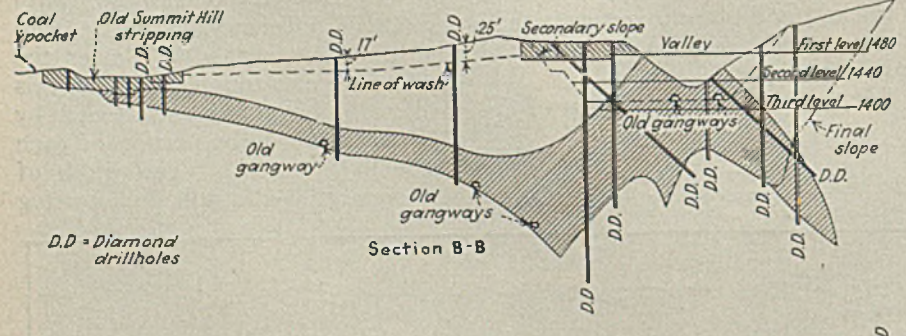
Three of these cars form a train which is handled by a 60-ton steam locomotive that takes them to the dump on the top of the hill lying to the north of the stripping. A switchback line two miles long is required between the cut and the dump because the location of the dump and the terrain of the basin necessitate such a length of road. The gradient will not be steep until the second and third levels are being excavated.

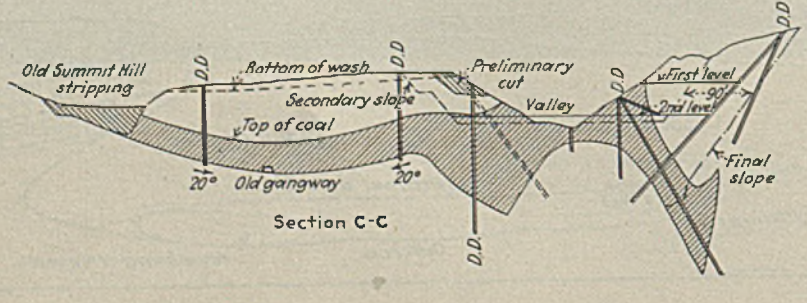


As Section A-A May Have Appeared Before Final Folding Pinched Some of the Peat Into the Void Under the Hanging Wall

Three Cross-Sections of the Summit Hill Basin; Location Shown on Page 205







At one time the shotholes were drilled by hand but of late drilling machines have been used exclusively. At first a Loomis electric churn-drill rig with traction wheels was used but in the newly purchased machines the rear wheels or even all four wheels are replaced by caterpillar tractors to reduce the slippage.

Three of the five Loomis churn drills installed on the job are of this type. Two are electric- and three gasoline-operated. One of the machines has caterpillars front and rear and is operated by a gasoline engine. Though the latter engine is more costly to operate it may be less costly in maintenance where the material is so creviced by undermining that the electric motors have to be run slow to avoid sticking the drill, for the motors in that case may became excessively hot.

An Armstrong drill-steel sharpener

is used to sharpen the well-drill bits. The drills are heavy and the terrain so rough that roads have to be excavated for their passage. Steel rope is now used for drilling. Each drill works three shifts and will sink a $5\frac{5}{8}$-in. hole 4.88 ft. in an hour, including delays of all kinds. The holes are drilled 15 ft. apart in each row, and the rows themselves are 15 ft. apart, the holes in one row being staggered in relation to the holes in the other.

FOR shooting 40 per cent gelatin in 4x8-in. cartridges is used. Last year 0.67 lb. of explosive was used per cubic yard excavated. In quarry work 0.50 lb. per cubic yard sufficed. To handle the cars 38-ton locomotives formerly were used, but these have been replaced by the 60-ton type. Consequently it has been decided to increase the weight of rail now used in the tracks from 60 lb. to 80 lb. per yard. Power for the operation of the shovel and some of the drills is received at 11,000 volts from the Pennsylvania Power & Light Co. and is stepped down to 2,300 volts for the shovel and 440 volts for the drills.

At the dump is provided a standard-gage Western spreader car which plows off the dumped material, forcing it over the bank. A standard-gage Nordberg track shifter also is in operation, and this, by engaging the rails and thrusting down a steel foot into the ballast between them, will lift itself and the rail as much as 3 ft., so that workmen can thrust ballast under the ties, thus holding them permanently in place. The trackshifter can then repeat the operation at another point until a length of track is raised to a height convenient for further dumping.

As a rule, however, the level of the dump is fixed and the only change desired, unless the track should sag, is a shifting of the dump sidewise. In this case the foot is inclined so that when it is thrust down it lifts the outer rail more than the other, sliding the track over toward the higher or dumping side. By repeating this operation at several points the rail is realigned. This shifter has done such good work that the company is now using a modified form of it for shifting the narrow-gage tracks outside the mines and finds that it saves time and much hard work.

IN order to reduce interest charges both on the equipment and on the vast amount that must be spent for rock and earth excavation before coal is obtained the shovel is worked double shift.

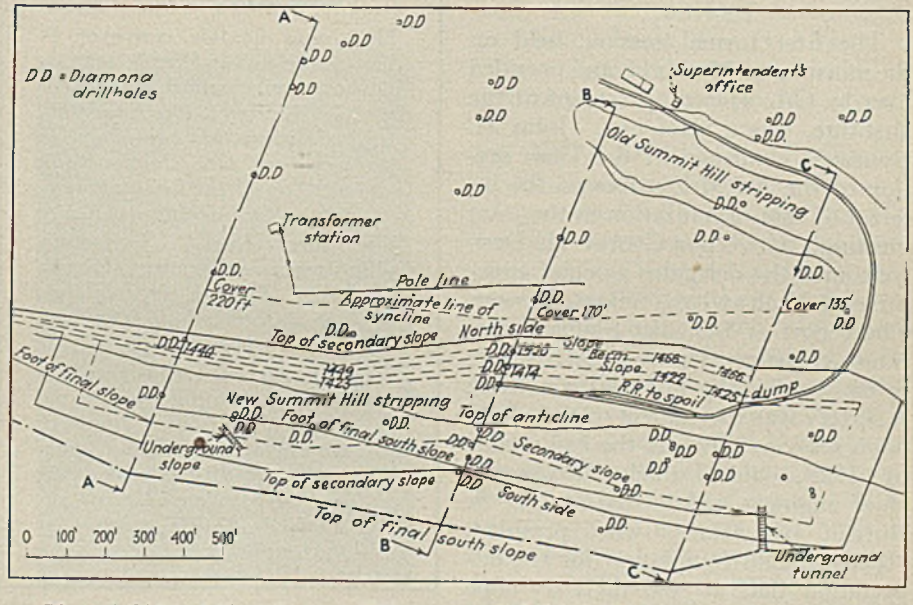
In "thorough stripping" the finding of space for disposal in a closely inhabited mountainous section is quite a problem. In a large, well-advanced stripping operation this difficulty can be partly met by backfilling other excavated areas, not, it is true, by casting with the shovel but by running the loaded cars into the area already exhausted and dumping them there.

THIS plan, so usual in Germany, cannot yet be followed at Summit Hill, as no sufficient excavated area is yet available anywhere in the earlier strippings, but the edges of some of the old mine caves on the flanks of a steep hill furnish ridges which may be used as footholds against which quantities of rock can be dumped without risk of sliding.

As has been said, the area being stripped was mined in part in the past by the methods which removed less than half the coal. The edges of the area also were stripped at a very early date, when hand work was the rule. A small gully gave the strippers an opportunity to gnaw the coal area near its edges. Later a larger area was excavated with small shovels, cars and locomotives. Now the stripper is back again, better fortified and more determined. This time he will perhaps complete the work of mining that others started and left, and certainly he will complete it on the south edge of the basin. The anthracite region is busily recovering the coal left in earlier years as a result of the vast progress that has been made in technique.

The Summit Hill area, in which the stripping described is being done, is the largest of the four stubby "fingers" that project from and are parallel to the southern edge of the long Nesquehoning basin. Each of the four fingers evidences the emergence of a syncline from the main area, which has protected the coal from erosion. As the synclines themselves rise toward the northeast the coal is cut off. Except at its root each finger is separated from the main coal body by an anticline from which the coal has been eroded.

The finger being nearer the disturbance which caused the main basin has been more fantastically, though not more deeply, folded than the coal of that basin. Though the syncline is shallow it is abrupt and has on the edge against which the pressure came a number of even smaller and sharper folds which in some cases collapsed and folded shut, squeezing out all or nearly all the peaty matter, now coal, into a large aggregate along the southern rim of the basin.



Plan of Old and New Summit Hill Stripping

The cuts necessary to uncover the deeper coal cost so much and take so long a time to bring their large ultimate returns that much credit must be given to the directorate and the president, S. D. Warriner, for the vision that makes them possible, as also to J. B. Warriner, the vice-president and general manager; W. S. Rausch, the mining engineer, and S. E. Thorne, the superintendent of stripping. Long vision of this kind should bring generous returns to the coal industry. Stripping methods where, as in this instance, the cover is not out of proportion to the coal thickness, gives cheaper coal, more complete extraction and a larger percentage of the desired sizes.

MECHANIZATION *and*

PROBLEMS of mechanization and safety dominated the program of the 28th regular meeting of the Rocky Mountain Coal Mining Institute, held jointly with the Utah section of the American Institute of Mining and Metallurgical Engineers at the Hotel Utah, Salt Lake City, March 11-13. Drilling and blasting for mechanical loading, roof control, machine loading and conveying, organization of mechanical and maintenance departments to meet the new demands placed upon them by modern mining and accident-prevention work were the themes of individual addresses and floor discussion.

The first formal session, held on the morning of March 11, and presided over by Otto Herres, president of the Institute, was a brief one. John M. Boutwell, chairman of the Utah section of the A.I.M.E., stressed the interest of that organization in the joint meeting. Governor George H. Dern welcomed the delegates as chief executive of Utah and as a fellow engineer. The report of Benedict Shubart, secretary-treasurer, showed the Institute to be in a healthy financial condition.

Safety was the subject of the afternoon session. Despite the bad record of 1928, said Daniel Harrington, chief engineer, safety division, U. S. Bureau of Mines, who presided, "there is solid foundation for the expectation that at last there is hope that the unsavory accident record of the coal mines will show satisfactory improvement." The improvement must come largely through education which begins at the top. Mr. Harrington scored lack of discipline in enforcing safety regulations and violations of rules by company officials.

The growing electrical hazards were emphasized by the speaker, who pointed out that electricity soon promises to be responsible for more fatalities than any other cause except falls of roof and coal. Open lights and smoking in closed-light mines again were condemned. The backwardness of the industry in adopting the use of permissible equipment was criticized.

How the annual number of accidents in the Dawson mines of the Phelps Dodge Corporation has been reduced from 443 in 1924 to 78 in 1928 and the rate per 1,000 shifts from 1.656 to 0.313 was described in a paper by William Moorhead, safety engineer of that company. Among other things, compulsory use of hard-boiled hats by all underground workers and of goggles by workers exposed to eye-accident hazards has materially cut scalp and eye injuries.

What's Doing

WHAT TYPES of mechanical loading predominate in different sections of the country?

G. B. Southward, mechanization engineer, American Mining Congress, answers that question in this story.

The Jones flexible conveyor is one of the Great West's contributions to mechanical loading.

G. D. Jones, the inventor, tells what this equipment is doing in this story of the meeting of the Rocky Mountain Coal Mining Institute.

The Liberty Fuel Co. is making a big success with power shovels.

G. A. Schultz, superintendent, describes how it is done in these pages.

What are current trends in preparation and cleaning?

Andrews Allen, Allen & Garcia, discussed that question at the Institute meeting, and his remarks are abstracted in this account of that meeting.

HARD-BOILED hats and hard-boiled shoes as accident preventives also were stressed by J. P. Russell, general safety inspector, United States Fuel Co. This company is pushing the use of goggles although some workers object to such protectors. Mr. Russell outlined in detail the various safety measures undertaken by his company. O. A. Glaeser, United Verde Copper Co., read a paper on metal-mine ventilation and paid tribute to the lessons his company had learned from ventilation work in the coal mines.

The importance of knowing the fineness of the coal-dust particles and the danger of relying wholly upon a fixed percentage of inerts in coal-rock dust mixtures were brought home by tests made before the delegates by F. C. Miller, chief chemist, Colorado Fuel & Iron Co. He added that tests he had made showed that there were cases where a mixture with 84.5 per cent inert was slightly explosive and a mixture with only 39.7 per cent inert was non-explosive. The fineness of the dust particles was the determining factor.

Mr. Miller voiced the opinion that some mines are re-rockdusting when it may not be needed and others, because of the fineness of the particles in the dust deposits underground, are enjoying only a fancied protection from explosion hazards. His presentation and other papers read at this session are treated more fully elsewhere in this issue.

THE greater part of the remaining sessions of the midwinter meeting were devoted to a discussion of mechanized mining. In just what state or section the greatest advance has been made in mechanization would be difficult to say, said G. B. Southward, mechanization engineer, American Mining Congress. Coal operators are taking a broader view of the problem. They realize now that the success of the loading machine involves not only the machine itself but consideration of mining methods, haulage and topworks preparation.

Scrapers predominate in the Pennsylvania anthracite region, said Mr. Southward, but conveyors also are coming into use. Scrapers and conveyors are preferred in mechanized mining in low seams in central Pennsylvania. In the high seams of western Pennsylvania, northern West Virginia and Ohio the trend is toward the mechanical loader. Mechanical loaders also lead in high coal in Illinois and Indiana, but pit-car loaders have made rapid strides.

"In eastern Kentucky, southern West Virginia, Virginia and Tennessee, it is probable that more mines are using conveyors and scrapers than mechanical loaders, but the tonnage from mechanical loaders probably is equal to that mined by all other forms of equipment" because the loaders

SAFETY *Dominate Winter Meeting*

Of Rocky Mountain Coal Institute

are working in the thicker seams. For many years coal from longwall faces in Alabama, Arkansas and Oklahoma has been loaded with the aid of conveyors. "Mechanical loaders up to the present time have been little used in any of these three states.

"All types of equipment are used to work room-and-pillar and longface mining systems. With the former, mechanical loaders are, in general, used only for entry advancement and for extending rooms, but there are a number of instances where pillars are being recovered with loading machines and in a few mines mechanical loaders are working on long faces. Pit-car loaders are employed for the most part with the room-and-pillar system; here they are used for driving entries and advancing rooms.

"Conveyors are used perhaps as much for longface mining as for room-and-pillar operation, in which case the pillars usually are recovered. Recently the tendency has been to use conveyors more than ever for developing narrow work. A number of operations have eliminated mine cars at the face, all the coal being loaded by conveyors. The scraper generally has been confined to pillar recovery or some form of modified longface work, although in the Pennsylvania anthracite field, rooms are advanced quite extensively by scrapers. In several instances in the bituminous fields scrapers also are being used to advance entries and rooms."

THE success of the Liberty Fuel Co., Latuda, Utah, in loading coal with three Goodman power shovels was related by George A. Schultz, superintendent. The first machine was purchased in May, 1926; the second in December, 1926, and the third in November, 1927. These shovels have loaded 344,000 tons since the first one was installed. In December, 1928, with two shovels working double shift, the machines loaded 22,000 tons; in January, 1929, 26,000 tons, and in February, over 21,000 tons. The shovels loaded 66 per cent of the coal produced in those three months.

Because heavy grades make hard traveling and because shooting to obtain the maximum percentage of lump coal makes hard digging for the machines, the repair and improvement costs have averaged slightly in excess of 8c per ton. The capacity of the motor has been increased from 15 to 35 hp. and the original arms of the shovel have been replaced by heavier ones.

Mechanical loading, continued Mr. Schultz, forced the coal company to discard a large number of small

Otto Herres

wooden cars and to replace them with 4-ton low-built composite cars. A new preparation plant was necessary and mechanical loading hurried it along. In the new tipple two 36x72-in. rolls with teeth were installed just ahead of the feeder so that the large lumps loaded by the shovels would be broken to a size approximating those produced by the hand loaders. The savings made by the power shovels largely paid for the new tipple, mine cars and other improvements at the mine.

"THE rolls enable us to take one man off each shovel crew; the actual loading crew now consists of an operative, a face man and a car trimmer. In addition to these is one man who loads by hand the first and last car out of each room. By thus loading one car before the shovel starts the room is kept clean and orderly. The last car is loaded out by hand to save the shovel the time necessary to make the final cleanup.

"During 1928 the shovels mined 10 acres of pillars. This was the first attempt of the company to use shovels for this purpose. Though it was quite successful it was slower than room work because double track could not be provided here, as in advancing rooms, for, if it were, a wide untimbered space would be necessary at the end of the pillar."

IN DEVELOPING a district for one of the shovels where the overburden exceeds 600 ft., explained Mr. Schultz, entries are driven by hand 14 ft. wide. Rooms are then driven in 60 ft. and crosscuts are made from one to the other so that the shovel can be moved directly from one room to the next through the first crosscut. Where workings are under light cover and going toward the outcrop, the shovel develops its own territory, driving entries and room necks 22 ft. wide. "If we did not have such an exceptionally good roof, this would not be good practice."

On Dec. 1, 1928, two shovels were double-shifted in new districts prepared for them. In one district there were eight rooms which had been driven 60 ft.; in the other, six rooms just necked. By the end of January these rooms were 500 ft. long and 40,000 tons had been produced from the fourteen rooms. A year ago one shovel, working single shift, was placed in a new district of seven rooms. In a little less than twelve months the rooms had been driven 700 ft., all the pillars drawn and the district forgotten.

"No light rail or machine wire," remarked Mr. Schultz, "has been purchased for five years and but little pipe. Because the area can be worked out in a short time, the material can be recovered and used over again. With the old hand-mining methods

a large quantity of this sort of material was tied up for years at a time. New workings always meant new material."

Many arrangements of tracks and rails have been tried at Latuda but rooms are now being driven on the strike 700 to 1,000 ft. long. Double tracks are set close together at the low side of the room with the upper track one car length shorter than the other. This arrangement allows the whole face to be cleaned up without any extension of the tracks during loading operations. The long rooms can be worked out with shovels even faster than the short rooms with hand loading.

"Early in the game we found the best method of shooting our coal to obtain a maximum of lump was to use ten holes, five across the top of a 26-ft. room and five about 4 ft. from the floor where the coal is 9 ft. high. The lower holes are shot with instantaneous and the upper with delay detonators. The corner of the place in which the shovel starts to load first is shot harder than the rest so that the shovel can get to the back of the cut. If this is done, it does not matter if the rest of the coal is standing, for once the shovel gets a loose end it is no trouble for it to dig and load out the rest of the coal. So far we always have been able to maintain the same percentage of lump coal using the shovels as we got with the hand loaders."

That the loading machine is leading progressive operating companies to rebuild their mechanical departments with more specialized and more technically trained personnel was brought out by F. E. Gleason, general master mechanic, United States Fuel Co., whose paper is abstracted on page 215. The discussion which followed the reading of the paper all centered upon a brief statement to the effect that the company was alloying its bits. The alloy is put on with an electric welder and at present costs about 5c. per bit. The alloy itself costs $10 per lb.

"The bit," explained Mr. Gleason, "is formed in a Sullivan bit-sharpening machine and it is then given a coating of alloy and goes direct to the mine. When it comes back, if there is enough alloy left on it it is merely resharpened and air-cooled. At first we tried a tempering process and tried to get more strength in the point. The bits broke. But by just air-cooling after resharpening we found we could get the best results. Machine men usually ask for rusty bits, i.e., untempered."

G. B. Southward

Mr. Gleason was unable to say how much longer an alloyed bit would last than an unalloyed bit if no rock were hit. "We have cut as high as 255 running feet and changed ten bits and the rest of the bits in the machine looked practically as good as they did when they started." When the bit strikes rock it usually breaks. "We try in putting the alloy on not to get too much on and in this way we get better wear. The alloy seems to penetrate into the steel under the action of the electric arc and makes the point brittle to a certain extent."

THE problems of drilling and blasting as affected by mechanical loading were treated in two papers abstracted elsewhere in this issue of *Coal Age*. H. Peterson, explosives engineer, Hercules Powder Co., covered methods under Utah conditions and D. C. Foote, safety inspector and mining engineer, Union Pacific Coal Co., conditions in southern Wyoming.

While stressing the advantage of delay caps, Mr. Peterson disclaimed any intention of advocating their universal use, as there might be conditions in some mines which would make their use dangerous. At the present time, he said, data on the hazard phase were lacking. Answering Mr. Harrington, Mr. Foote stated his company purchased explosives in car lots and a carload seldom lasted at any one place over two months. No loss of sensitiveness after storage had been experienced with 1¼- and 1½-in. sticks; there had been a little trouble with the 1-in. size.

Discussing Mr. Foote's paper, Mr. Anderson said that "we have found it a distinct safety feature to short-circuit the outside end of the leading wire whether wound on a reel or hung up on the ribs on insulators. Automatic clips or some convenient arrangement can be provided so that the minute the wires are disconnected from the blasting machine the automatic short-circuit will be provided so that any stray currents that may be picked up will go through the shorted ends of the wire instead of the caps."

CLOSE supervision of shotfirers is necessary, Mr. Anderson thought, if the advantages in the use of small cartridges are to be realized. "There are," he remarked, "really two objects in using a small cartridge: (1) To gain the small unit of weight so that if an extra cartridge is used the overcharge is not so great; (2) to get the longer charge and air space. The same result can be obtained by using an explosive of lower density and lighter weight."

Whether the placing of two or more charges in one hole where there is a burden of 6 or 7 ft. of coal on the hole or at the back is safe was raised by Messrs. Harrington and Russell. The hazard, said Mr. Harrington, is not so much from possible overloading of the hole by exceeding the permissible as from the possibility of misfires—particularly of the interior charge. F. C. Miller scouted the suggestion that the average machine man "is going to hunt around for a couple of wires to put on a galvanometer and see whether the shot is safe or unsafe."

Further details of the operation of the Jones flexible conveyor in the mines of the Victor-American Fuel Co. were given by G. D. Jones. The initial installation at the Pinnacle mine (*Coal Age*, Vol. 33, p. 156) was set up in rooms running directly up the pitch. While this worked satisfactorily for over a year, the fact that cars were loaded at each room neck was a disadvantage. To overcome this the method of mining was changed and rooms are now worked on the strike, discharging onto an entry conveyor, which in turn discharges at a common loading point.

THE thickness of the coal in this section averages 5½ ft. All brushing was eliminated after the introduction of the conveyors. One unit operated eighteen months and produced over 40,000 tons. Another unit has been installed and additional units are under consideration. At Wadge a unit has been installed with the entry conveyor working on the pitch of the seam and branch or room conveyors approximately on the strike. This unit is in 8½-ft. coal; the pitch of the seam is 15 per cent.

Over 50 per cent of the Wadge output is conveyor loaded.

At Delagua there is a main-entry conveyor 900 ft. long operated by one drive. From this are two cross-entry conveyors, one working to the south with coal coming down a pitch of 2.45 per cent and the other to the north delivering coal up a pitch of 2.45. Branching from these two cross-entry conveyors are the producing rooms. The coal is about 3 ft. thick and has a very bad roof but the machine is operating satisfactorily because the narrow width of the conveyor permits close timbering.

In a practically level seam of 3-ft. coal at Chandler a unit is working out a block of fourteen rooms of which eleven have been completed. The machine has enabled "us to save all brushing costs as well as to permit concentrated mining." All pillars are pulled at Pinnacle, said Mr. Jones. The rooms there usually are 35 ft. wide with 15-ft. pillars. There are six men loading at this mine, one man chucking and trimming cars, two machine men to cut and drill, and one man to take care of the machine and pans in advancing the conveyors. The output is 15 to 20 tons per man.

A REVIEW of trends in coal preparation by Andrews Allen, Allen & Garcia Co., concluded the morning session on March 13. Fuel efficiency demands clean coal and a reasonably constant ash-content. This has made uniformity in product a dominant factor in marketing and given a new importance to preparation. Preparation, he said, must be considered from two viewpoints—the economic and the technical. The former takes into account the comparative losses in material under hand and mechanical cleaning, the investment in equipment and the marketing zone in which coal carrying the extra costs of better cleaning may be sold at a profit.

A comprehensive study of the physical and chemical characteristics of the coal to be treated is basic in the technical consideration of the problem. How far is it wise to go in eliminating removable impurities? Will the market pay enough more for a greater reduction to justify the rejection of additional material in the raw feed? What will be the effect of close cleaning on the ash-fusion point? Mr. Allen touched briefly upon the leading cleaning systems now in use here and abroad and the underlying principles upon which they operate.

Roof control was the first topic of the final session Wednesday afternoon. In a written discussion by William Brennan, Phelps Dodge Corporation, on the paper by W. H. Weimer, Union Pacific Coal Co., abstracted on pages 227 and 228, Mr. Brennan said that too much stress could not be laid on the fact that props left in the gob are detrimental to roof control. While the props probably break off in time "they have a tendency to throw the weight over the coal, causing unnecessary pressure at this point.

"Mr. Weimer has not mentioned one of the results of not being able to control a break-off of the roof as desired, i.e., heaving of the floor. This heaving in some places causes more trouble, difficulty and added expense than direct caving of the roof. In a number of operations with which I have been familiar the roof has held in fair shape but the floor has come up and practically closed in the open spaces between the pillars, necessitating a considerable amount of brushing."

Andrews Allen

Who's Who

B. W. Snodgrass, president of the Victor-American Fuel Co., Denver, Colo., was elected president of the Rocky Mountain Coal Mining Institute for 1929-30 at the winter meeting of the organization, at Salt Lake City, last month. He succeeds Otto Herres, general manager, United States Fuel Co. Benedict Shubart, Denver, was re-elected secretary-treasurer.

F. C. Miller, Trinidad, Colo.; Fred Koelling, Dawson, N. M.; B. B. Brewster, Salt Lake City, and D. C. Foote, Rock Springs, Wyo., were elected vice-presidents.

The members of the executive board chosen at the meeting were: J. R. Barber, Raton, N. M.; G. C. Davis, Mt. Harris, Colo.; Lyman Fearn, Rock Springs, Wyo.; T. C. Harvey, Columbia, Utah; L. M. Kuhns, Gamerco, N. M.; R. S. Robbins, Standardville, Utah; T. C. Russell, Butte, Mont., and J. S. Veatch, Denver, Colo.

THE mining engineer of today, said F. C. Miller, has a better roof control by the method of quick extraction for room-and-pillar than did the engineer a few years ago who was obliged to work rooms for quick production, at the expense of development, and to leave room pillars standing until the time came to retreat from the face of cross-entries. A pack takes the overburden load today where the pillars held the load a few years ago.

E. G. Turner, division engineer, Colorado Fuel & Iron Co., emphasized how little really is known about many of the factors entering into roof control. "What is the use," he asked, "of constructing a formula for roof control when that same formula could be used in only a few localities scattered her and there over the country?"

An appeal for widespread support of the development and sale of automatic coal-burning appliances in the home was made by J. M. Orr, who saw in such equipment a real weapon against gas and oil competition and an answer to the drive for smokeless combustion of fuel. E. A. Weideranders, Jeffrey Manufacturing Co., gave a movie talk on the history of loading machines and the new equipment of his company.

Mr. Brewster described the operation of the Sullivan electric slusher in the Blackhawk mine of the United States Fuel Co. and the work done by Sullivan machines in the mine of the Columbia Steel Corporation. One thing that had been definitely established by the work there, he said, was that shearing increased the percentage of lump. Mr. Hershey, Mancha Storage Battery Locomotive Co., showed several slides of the pit-car loaders made by his organization. Mr. Shubart showed views of the Goodman power shovel mentioned in Mr. Schultz's paper. A movie of Sanford-Day cars followed.

The last contribution to the cinematographic finale was a display of Russian pictures taken by the Allen & Garcia organization with Mr. Allen as the impresario of the afternoon.

SNUBBING PAN

Used With Machine Loading

AT FRANKLIN COUNTY MINE

IN No. 6 seam of southern Illinois coal that is to be loaded by machine usually is undercut and "snubbed" before it is shot down. This snubbing consists of removing 12 to 24 in. of bottom coal and a rock seam ½ to 3 in. thick above it, which is known as the blue band. Light shots are placed just above this parting and after these have been fired the coal is shoveled out by hand.

At one mine in the field, No. 7, a 4,500-ton operation of the Franklin County Coal Co., Royalton, Ill., the snubbed coal is allowed to fall on pans which are placed in the undercut before the snubbing shots are fired. When the coal, loosened by these shots, has fallen the pans are pulled out by a gathering locomotive to a position just in front of the face.

These pans are flat sheets of No. 10 gage steel with several pointed lugs and a 1-in. angle welded to the upper face. The pans are 2 ft. wide and 6 ft. long and have a 4-ft. length of ⅜-in. chain attached to one end. Usually the pans are placed in the undercut about 14 in. apart.

After the snubbing shots are fired the pans, with their load of coal topped with the blue band, are pulled out in front of the face. The blue band is then skinned off and thrown aside and the pans dumped or otherwise freed from the coal and piled back out of the way of the loading machine. Thus the dirt band is eliminated from the coal and the face is almost freed of snubbings, thus giving the coal to be shot a good opportunity to fall.

As a pan complete with chain weighs only 78 lb., one man can easily drag it around and place it under the coal. This is done by the night drill crew, which consists of two men. Where pans are used the bugdust is not removed from the undercut.

After the snubbing shots are fired two men with a 6-ton gathering locomotive make the rounds and pull the pans, which formerly were hitched directly to the locomotive. Later, because of the unsteady pull and the damage to the track, a jack pipe with block and tackle and single tree were introduced. A ⅝-in. wire rope was used. With their aid three pans can be, and usually are, moved at one time, at one-third the speed of the locomotive and with three times the pull. It is reported that all the pans in a 30-ft. room can be drawn in 25 minutes. A motorman and triprider can pull all the pans in six to eight rooms in one hour. This number of rooms constitutes a loading-machine territory producing about 300 tons of coal daily.

A pan cleaner crew of two men follows the puller. These men shovel about half the coal from the pans onto the mine floor and as they do it they pick out the blue band. The remainder of the coal is dumped by tipping the pans with a crowbar or by hand.

A set of pans is provided for each place worked by the loading machines. For a 30-ft. room nine pans are used, thus 18 ft. of the width is covered, leaving 12 ft. in the ten spaces between pans.

Counting the first experimental units, approximately 1,000 pans have been purchased for the mine. Till recently seven loading machines were used and all the working places thus equipped were furnished with pans. Now only three of the loading machines are running and many of the snubbing pans are idle.

The pan system was first used in this mine in November, 1927, and became general for all mechanically loaded places during February, 1928.

H. H. Taylor, Jr., chief engineer, who together with William Smith, general superintendent, developed and patented the snubbing pans, states that

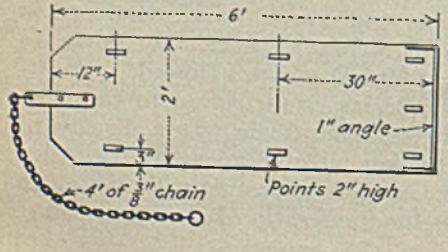
(*Turn to page 226*)

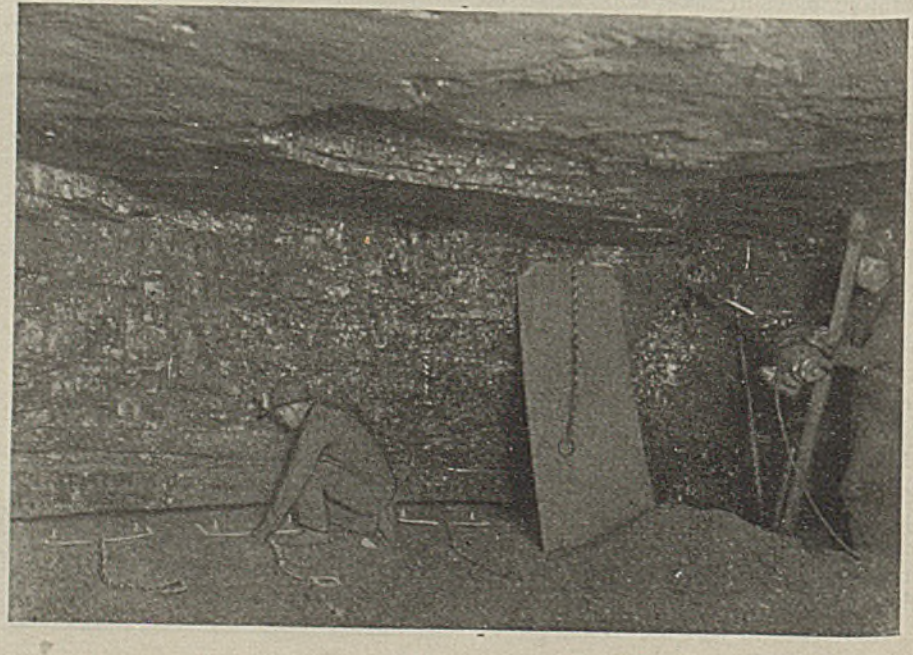
* * *

At Right: Drilling Shotholes and Placing the Pans; One Pan Was Leaned Against the Face to Show the Construction

* * *

Below: Showing Arrangement of Pointed Lugs





GAS OUTBURSTS

What They Are... And How They Occur

By Henry Briggs

Hood Professor of Mining,
University of Edinburgh
Edinburgh, Scotland

SUDDEN outbursts of gas in coal mines give the management much cause for apprehension. They discharge large volumes of firedamp into the workings and thus obviously introduce the possibility of a severe gas explosion. Experience shows, however, that this is not the principal risk attending an outburst. Paradoxically enough, the very magnitude and suddenness of the phenomenon diminishes this hazard, the flame lamps over large areas of the mine being instantaneously extinguished by the pressure wave. Indeed, I cannot recall a single instance in which it has been proved that any of these large outbursts has caused a gas explosion. Suffocation, either by the gas itself or by the soft, pulverulent coal blown out with the gas is, events show, much more likely to cause the death of workers in the vicinity, and many instances are on record where men have lost their lives in that way.

Apart from the questions of risks and safeguards, however, these sudden outbursts present an interesting scientific problem. These outbursts are of two classes. In the first, the gas is discharged from the subjacent or superjacent strata; in the second —the more important and more interesting type—the outburst is from the coal seam itself.

Outbursts from the floor or roof seem to have been relatively common in England in the middle of the last century, and nearly all of them occurred in longwall mines. Curiously enough, though the longwall method has been steadily growing in importance in that country ever since the period mentioned, violent emissions of this character are now rare. A typical example of such an outburst was that at the Strafford Main Colliery, Barnsley, Yorkshire, in 1867. The Silkstone Seam, 6 ft. in thickness, was being mined by longwall at a depth of 720 ft. The floor began to lift near one end of a 900 ft. face, and suddenly, after a heavy "weighting" of the roof, wide cracks parallel to the face developed in the floor out of which great volumes of firedamp were emitted. It was estimated that about 150,000 cu.ft. was discharged in 7 minutes and gas continued to be evolved at a gradually diminishing rate for six weeks. At other pits in the same coal field large masses of the floor stratum were detached and flung upward by these blowouts, or, where the floor was soft, the edges of the vents were bent upward. Similar outbursts sometimes came from the roof.

THE cause of these occurrences is not far to seek. If below or above the workings and at no great distance away, is another seam or a belt of porous rock holding gas under pressure, and if between the two there is an impervious bed which can easil bend, the relief due to the advance of the workings allows the latter bed to flex up or down, as the case may be, under the pressure of the gas. A great gas blister thus forms and, unless pricked by means of a borehole, it may burst suddenly, thus ejecting the accumulation into the workings. In this instance, boring is an effective safeguard, the drillholes allowing the gas to discharge quietly. Gas in the roof strata, though the conditions may not be favorable for the development of an outburst on a large scale, not infrequently makes the roof treacherous, and here again boreholes, though only a few feet in length, have been found effective in draining off the gas and improving the roof.

Generally speaking, the outbursts of gas from solid coal are infrequent; but some districts have acquired an unenviable notoriety in this regard. Such outbursts are the result of a concatenation of certain well established conditions. The seam must be gassy; it must be dry, for coal containing any appreciable proportion of free moisture is quite immune; and there must be, at the locus of the outburst, a mass of loose, finely comminuted coal. Comminution of the coal *in situ* is a consequence of earth movement; as a result, outbursts from the solid are most likely to occur in regions—the western part of South Wales, Belgium and nothern France, for example—that have been subjected to great compressive forces in the course of their geological history. When such outbursts have happened elsewhere it has generally been found that the puverized coal occurred alongside or in close proximity to faults which brought about the disintegration. In an outburst of this kind large quantities of fine coal and dust are violently ejected with the gas. Occasionally doubt has been expressed as to whether the disintegration of the coal is not an effect of the outburst; but the evidence is definite: the powdery coal occurs *in situ;* it is a cause and not a result of the emission.

The quantity of dusty coal and gas discharged in the course of a few minutes, or even a few seconds, sometimes is enormous. In the case of a great blowout from the solid which occurred in 1907 in the development of the Nord d'Alais colliery, Gard, France, about 1,000 tons of fine coal was blown up the shaft and settled down over 50 or 60 acres at the surface. The shafts and roads were blocked with it, and 4,000 tons was subsequently removed from them. Many millions of cubic feet of gas must have been discharged. In this

instance the gas was not firedamp but almost pure carbon dioxide. It flowed over the surface like lava from a volcano. A choking feeling due to the gas was felt a mile away. The emission continued for twelve hours.

A SIMILAR blowout, displacing 5,000 tons of coal, occurred at the near-by Rochebelle mine in 1920. The carbon dioxide was emitted so quickly that, five minutes after the shot which caused the outburst had been fired—from the surface, fortunately—the gas had filled the galleries and shafts and was pouring out over the surface in such volumes as to force the inhabitants of the neighboring houses to evacuate them.

Irruptions of carbon dioxide from coal are altogether unknown in Great Britain and, I believe, in America; but there have been many of them in the Gard district of France and in the Waldinberg-Neurode area of Lower Silesia. The origin of the carbonic acid itself constitutes an interesting and unsolved problem.

Firedamp outbursts, of course, are more numerous. In the Mons (Belgium) field gas outbursts occurred at an average rate of once in every thirty-eight working days during the period 1869 to 1898. British Columbia also has an undesirably close acquaintance with firedamp blowouts. According to the Chief Inspector's report on the last of them, which occurred Aug. 30, 1928, 43 blowouts have been recorded at the No. 1 East Mine of the Coal Creek Colliery, and several hundred were experienced at the Cassidy mine, Vancouver Island, some having fatal consequencies. So serious was the menace in the latter instance that, after extracting the pillars already blocked out, the areas most liable to outbursts were abandoned. The section in which the last blowout occurred on the Coal Creek property also has been closed. An enormous firedamp outburst took place at the Morrissey Colliery, British Columbia, in 1904, with the loss of 14 lives. James Ashworth, who described it, estimated that from two to three million cubic feet of gas was emitted and 3,500 tons of soft coal displaced.

THOUGH on a smaller scale, a series of 21 blowouts occurred between 1918 and 1925 at the Ponthenry anthracite mine, on the western fringe of the South Wales coal field, an area providing abundant evidence of great horizontal thrust. Several men were smothered by the firedamp and fine dust. So troublesome and dangerous did these become that George Roblings, then agent of the mine, decided to adopt the method, practised with good results in France and Belgium, of blasting the coal in affected districts by means of large shots fired electrically from some point underground at a safe distance from the coal face, or even from the surface, and at times when no one except shot firers were in the mine. No one is permitted to break down coal with a pick in a place which is under suspicion, the aim being to release by shooting in one shift as much coal as can be removed during the ensuing shift.

This procedure does not prevent outbursts. On the contrary, it aids their occurrence, but under conditions that reduce the risk of loss of life to a minimum. It has improved the safety of coal getting at Ponthenry, though unhappily, without providing complete immunity from the dangers of outbursts, for on one occasion since its introduction a man was killed by an unexpected blowout.

GAS SOMETIMES BURSTS from the roof and floor, but these outbursts are not nearly so severe as those from the coal face. The coal must be gassy, dry and pulverized. Apparently it is sometimes rendered by some unknown natural process more than usually adsorptive of gas—"activated," as substances thus modified are described. A big blowout blew 1,000 tons of coal up the shaft and covered 50 or 60 acres with the dust. The gas being carbon dioxide the blanket of gas nearly suffocated persons and animals on the surface.

As a rule an outburst gives warning at this colliery by a certain liveliness in coal: noises in the solid, which the men term "pounces," become frequent. When the seam is in a normal state the pounces are sharp and clear, but when a danger zone is being approached they become dull and heavy.

IN OTHER mines liable to these sudden emissions it has been observed now and then that the usual rate of discharge of firedamp slackened some time before a blowout; indeed in all collieries liable to them a continuous watch can with advantage be kept on the output of gas. A regular discharge is indicative of safety and an unusual increase or decrease a sign of danger.

To what are these outbursts due? It was believed at one time that the gas was contained under pressure in large openings or pockets in the coal. There is, however, no evidence whatever to support such a theory and it may be dismissed forthwith. As shortly will be shown, the solid coal itself is capable of storing up more firedamp or carbon dioxide under pressure than an open space of the same volume.

That the gas is pent up under pressure undoubtedly is true. The classical experiments of Sir Lindsay Wood demonstrated that firedamp occurs in solid coal under pressures of several hundred pounds to the square inch. The amazing thing is not that such pressures should exist but that they are not much higher. Before mining commences a seam must support the weight of the superincumbent strata, and an old rule—approximately correct for coal measures—states the latter to be equivalent to one pound per square inch per foot of depth. For example, a virgin seam lying 1,000 ft. below the surface carries a pressure of about 1,000 lb. per square inch.

COAL is a substance which flows readily under heavy, sustained pressure, and one could, I think, be excused for assuming that the pressure of firedamp *in situ* ought not to be appreciably different from that due to the weight of the overlying rocks. No such pressures have been registered in mines, so far as I am aware. That perhaps is because such boreholes as have been drilled into a coal face for the purpose of making the measurement have been too short to reach coal from which none of the firedamp has escaped along cracks and cleats. However this may be,

there is no gainsaying that high gas pressures commonly exist in a seam at points even 10 or 20 ft. in advance of the working faces.

The experimental work of J. Ivon Graham and myself showed that outbursts from the solid are capable of complete explanation from the ability of dry coal to adsorb or dissolve firedamp or carbon dioxide, and, working independently, we studied the effect of pressure on its adsorptive capacity.

To make the phenomenon clear, a word is necessary on the general characteristics of the process of gaseous adsorption. Substances like charcoal and coal are traversed in all directions by minute passages. The larger capillaries or pores are visible under the microscope in all charcoals and in some coals; but a channel which is large enough to be seen by the microscope plays only an insignificant part in adsorption. The gas is principally held upon the surfaces of passages whose diameter is, on an average, not many times greater than that of a molecule of methane. These surfaces have the property of attracting the gas molecules to themselves.

So powerful is the attraction exercised by the surfaces of cocoanut charcoal, such as is used in certain types of gas respirators, that the molecules are packed or condensed upon them under a pressure of the order of 10,000 atmospheres. Thus it comes about that, even at ordinary atmospheric pressure, some of these specially effective or highly "activated" adsorbents can fix or grip in this way several times their own volume of methane and a still greater volume of a gas like carbon dioxide, which is easily liquefied. J. I. Graham showed experimentally that a bituminous coal, even at 30 deg. C., may adsorb as much as three times its volume of methane at atmospheric pressure. An anthracite can hold much more. The capacity of all adsorbents is increased by cold and also by pressure. The last fact is of prime importance in the rationale of outbursts.

IN THE course of an inquiry into the relation between pressure and the capacity of adsorbents I filled a steel gas cylinder with dried coal powder obtained from an actual outburst at Ponthenry colliery. The coal was tightly packed; a small plug of asbestos wool was inserted in the neck of the cylinder, and the valve was soldered in place. The cylinder was then charged with dry firedamp analying about 98 per cent methane —it also was obtained from South Wales—so as to restore the *status in situ* of the material prior to the blowout. A throttle valve and pressure-gage being attached, the gas was allowed slowly to flow out again through a meter.

By these simple means it became possible to ascertain the volume of firedamp the coal could hold at any pressure. Though the dust was tightly packed, much interstitial space remained between the particles. As no such space can have existed in the coal before the outburst, it became necessary to determine its relative volume. This was done and the needful correction applied, so that the figures eventually obtained referred to the volume of adsorbed gas that could be discharged from the soild coal when the pressure was released. The experiment was repeated with carbon dioxide, in order to reproduce the conditions of the Gard outbursts mentioned above.

It was found that, up to a pressure of about seven atmospheres, the quantity of firedamp held by the coal exceeded that compressible into an open space of the same volume as the coal, and that the disparity was much greater with carbon dioxide. Particulars are given in Table I.

Table I—Gas Adsorbed by Coal Under Pressure

Gage Pressure Atmospheres	Available Volume of Gas in One Cubic Foot of Coal from Blowout*		Available Volume From an Open Space of 1 Cu.Ft.
	Firedamp, Cu.Ft.	Carbon Dioxide, Cu.Ft.	
1	2.0	4.0	1
2	3.5	6.9	2
3	4.7	9.0	3
4	5.6	10.6	4
5	6.3	11.9	5
6	6.8	13.0	6
7	7.1	13.9	7
8	7.4	14.8	8
10	...	16.3	10

*I. e., the volume that would be emitted when the pressure was released to atmospheric pressure.

The interesting and apparently paradoxical point emerges that a receiver which is packed as tightly as possible with dry coal—or, better still, with charcoal—will hold more gas at, say, three atmospheres pressure than the same receiver containing no solid substance inside. From the point of view of gas capacity the coal behaves as if it had a negative volume!

The mechanism of these blowouts from the solid is clear enough; they are due to the co-existence of three factors, namely, (1) the presence of gas under pressure: (2) the presence of a mass of dry disintegrated coal which holds the gas adsorbed in its own substance and which is loose enough to move under a sudden relief of pressure and to set free at a very rapid rate the greater part of the gas; and (3) the existence in the seam of portions of low permeability which interfere with the normal discharge of gas from a zone of soft coal, or, as a more probable alternative to the last, the adoption of a mode of working—such as the Welsh single- and double-room methods, or the driving of headings in the solid—which affords little opportunity for the gas to drain quietly from the pulverulent coal.

Continuing the experimental inquiry which furished the results set forth in the table, a sample of normal anthracite was ground to a state resembling that of the blowout coal, dried and placed in the cylinder. It was found that the quantity of firedamp that the artificially comminuted anthracite could adsorb at any pressure up to ten atmospheres was appreciably less than with the outburst

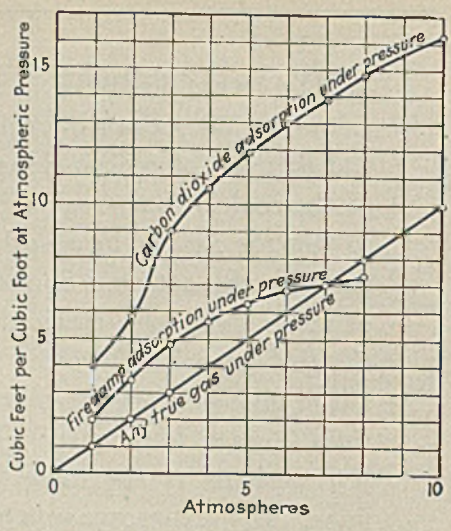
WHY ARE OUTBURSTS in the United States almost unknown and yet not infrequent in many mines in Europe and British Columbia? Has compression pulverized some of the coal in those regions and also indurated other coal so that the gas can be adsorbed but cannot escape? Is gas pressure the outcome of rock pressure? Is the presence of water a sign of a creviced condition of the coal that lets the gas escape? Does the frequent presence of moisture aid in giving American mines immunity? These are questions this article suggests. The worst outburst in America was perhaps at the Luke Fidler Colliery, an anthracite mine. The occurrence was not nearly as severe as most of those Mr. Briggs records.

coal. Without desiring to overstress a conclusion deduced from a single example, the test nevertheless appears to show that, either as an effect of heating or of some unknown cause, the adsorptive properties of the outburst coal had been improved, or, to use the technical term, it seems to have been "activated." An activated coal, called "bachite" was actually prepared from Pennsylvania anthracite during the latter part of the World War, but this outburst material is, I believe, the only one on record of an adsorbent that was activated by natural agencies.

I HAVE already stated that gas outbursts are unknown where the coal is wet. The reason is not in doubt. In common with other substances having similar physical properties, coal has a greater affinity for water than for firedamp. If placed in the presence of both it will adsorb water in preference to methane. Dampness reduces the gas capacity of a coal to one-quarter or less. Moreover, if a dry coal thoroughly saturated with gas under pressure is brought into intimate contact with water, it throws off most of the gas and takes up water in its place.

This fact suggests that, instead of using heavy explosive charges to cause a blowout at a predetermined time, water might be forced through drillholes into the soft mass. Acting on my suggestion, preparations were made at Ponthenry Colliery to try out this method of liberating the gas, but two serious difficulties intervened. In the first place it was found to be almost impossible to keep a drillhole open after it had penetrated into disintegrated coal; the fine material was promptly blown down the hole and choked it. And, secondly, it was far from easy to pack so tightly round the pipe inserted in the hole that a pressure of 800 lb. per square inch could be withstood, that being the water pressure provided. These practical difficulties led to the trial being abandoned. Circumstances were soon to arise to prove the soundness of the principle, however: an examination of the *loci* of two of the outbursts promoted by shotfiring showed that the blowouts had not extended into adjacent areas of soft coal which happened to be wet.

The belief, once widely held, that drilling boreholes in advance of the faces of work in seams liable to outbursts was a safeguard is now generally discredited, and the practice has been discontinued at many collieries which formerly relied on it. Because



Why So Much Gas Comes from So Small a Space

of its liability to choke, such a hole has little effect in draining gas. It should be observed, however, that long advance holes sometimes have given timely warning of the existence of a zone of pulverulent coal ahead, and occasionally the warning has taken an unmistakable and dramatic form, the drill-rods being blown out of the hole. Though he is not prepared to discount the value of advance holes entirely, Chief Inspector James Dickson, in reporting on the blowout at Coal Creek Colliery, British Columbia, in August last, stated that their extensive application at that mine had given negligible results. He also said that at the Cassidy Colliery, Vancouver Island, boreholes were systematically kept in advance of the faces, but that they gave no serviceable indication of the special danger to which that mine was so acutely liable.

Samples of fine coal obtained from outbursts at Ponthenry Colliery, South Wales, and at Coal Creek Colliery, British Columbia, furnished the screen analysis in Table II.

Table II—Screen Analyses, Outburst Coal

Screen Mesh per Inch	Percentage by Weight—Ponthenry Outburst Coal	Coal Creek Outburst Coal
+30	65.0	28.0
30–50	16.3	12.4
50–70	7.2	14.0
70–100	2.3	4.8
100–120	1.1	5.6
120–180	1.2	4.0
—180	6.9	31.2
	100.0	100.0

The relative proportions of the finest material is striking, and the dangerous character of the Coal Creek coal with its large proportion of minus 180 dust is apparent enough. An examination of the Ponthenry coal, however, reveals that, unlike that from Coal Creek, every particle, no matter how small, is slickensided. Though it may not so appear on the screen analysis, the coal has actually been finely comminuted by earth movements, and its present physical state is such that any firedamp it may hold can be discharged with rapidity.

The Reader's View

The February foreword in *Coal Age*, commenting on the immediate prospects for colossal combines of bituminous coal mines, goes on to remark that much may be accomplished (within the law) by association short of actual merging. This suggestion strikes a responsive chord.

The genius of our race is essentially individualistic, and any departure is bound to cramp our style. It is unfortunate that our anti-trust law permits several concerns to merge, but will look upon an association of the same ones as individuals, as a conspiracy. Having an engineer President, may we not hope that this situation will be dealt with in the near future?

The benefit resulting from giant combines is essentially stabilization of the market. While that is a desirable object, we should not lose sight of the fact that a low unit price is the surest means of holding and expanding the market. Furthermore, in view of the vast acreage of available coal in this country, one may be sure that the only infallible method of stabilizing the price of coal at a profitable level is by getting the cost of production of the legitimate mine so low that the snowbird cannot compete. This will come only from development of machine processes in mining comparable to those in manufacturing.

In the past only the larger companies have been making any experiments along that line, but there is no reason why a group of independent operators cannot carry on similar studies. A group of associated concerns can obtain all the benefits of organic combination, retain much of their independence, and all the economy of owner management, by co-operation along four lines. The first two suggested below offer no points which are repugnant to the most confirmed individualist, and one may hope that the last two would follow as a logical outcome of the undoubted success of the former:

(1) Employment of a common technical staff under an outstanding engineer, giving the small operator the benefit of specialists and permitting research on a practical scale.

(2) Maintenance of a common purchasing agent, giving the benefit of mass buying and the reduction of stock.

(3) A regional sales agency; this should eliminate dumping through fear of the failure of the market to go around.

(4) Joint guarantee of funded indebtedness, thus obtaining cheap captial.

Toledo, Ohio. ALFRED PEARSON.

Mining Turns From Men To Machinery

By F. E. Gleason
General Master Mechanic
United States Fuel Co.
Hiawatha, Utah

MECHANIZED mining presents new problems every day to the electric and mechanical departments of mining companies. These problems relate to: (1) Personnel organization; (2) changes in equipment necessitated by mechanized mining; (3) maintenance.

Because mechanical equipment is increasing in complexity, the personnel of the mechanical department must be of high standard, preferably men with some technical training and broad experience. The United States Fuel Co. maintains a central mechanical department headed by a general master mechanic and chief electrician whose duty it is to advise the local organizations at the mines, see that improvements are properly executed, the condition of the equipment maintained and sufficient repair parts of the right kind are kept on hand. He also supervises the work at the central repair shop.

At each mine the mechanical establishment is headed by the local master mechanic, who is responsible for the men and equipment under him, and he in turn is responsible to the mine superintendent and general master mechanic. Thus the mechanical and electrical department, supply department and central shop function as one unit, thus greatly curtailing outages in equipment and saving time.

With mechanical loading have come increases in power demand and a load with characteristics different from that which previously had to be handled. In the past, where mines used direct current exclusively, underground haulage, at least in the larger mines, made the heaviest demands on the power circuit. These were of a more or less intermittent character. Today the motors of mechanical loaders operate nearly at full load for many hours at a time. These motors usually are unfavorably situated, located as they are in rooms or entries on the ends of supply lines. Unless great care is taken the voltage is low and burnt-out armatures and other motor troubles put the loading machines out of commission. There is but one remedy: to maintain the correct voltage at the motor terminals.

In general, mechanical loading concentrates the production within a small area and consequently makes a heavy demand at a limited number of points. The placing of underground substations or large feeder cables is the usual solution. The general mine plan, however, should govern the method adopted for obtaining the power at the points where it is needed.

Three-phase alternating current would be preferable for all purposes other than motor haulage because less copper is needed for distribution and because with it the arrangement of the substation can be made more flexible at less expense. Rooms advance rapidly with mechanical loaders, for which reason line extensions and bonding are likely to be neglected. When rooms are long, temporary lines may be placed along the rib. A good way of feeding current to the reel type of gathering locomotive is to use a long single conductor cable and to return the current through the track with temporary bonds. A small portable type of recording voltmeter placed at or near a loading machine will give surprising information concerning voltage and operating conditions.

MACHINE-LOADED cars hold at least 25 per cent less coal than hand-loaded cars, so the rolling stock will have to travel one-third more miles to handle the same output. This difficulty may be overcome by increasing the number of cars and locomotives, by increasing the size of the cars or by speeding up the haulage. The last expedient is one of much interest to the mechanical department. A change in gear ratio that reduces the free-running speed but gives quick acceleration is often desirable for gathering locomotives. Main-haulage units on long hauls should be speeded up or the number of cars per trip increased. Better and heavier room tracks are needed to handle the heavier types of cutters and loaders.

At the tipple the larger coal delivered by mechanical loading chokes the feeder and chutes and bends the screens. Often additional clearance has to be provided over the shakers and chutes. Box-car loaders have to be built larger and stronger.

Selective mining being almost impossible with most types of mechanical loading, additional picking belts must be installed. To this end light and safe working conditions must be provided in an already overcrowded space. To dispose of the refuse additional chutes or conveyors have to be installed.

MACHINES should be withdrawn from the day's run whenever the mine electrician thinks it should be done. If the superintendent or mine foreman decides that the machine is needed badly enough to justify running the risk of keeping it in service he should assume all responsibility for what may happen and not count the off days resulting as chargeable to mechanical failures. Parts in bad order should be repaired at the end of the shift if possible.

Proper lubrication often presents perplexing problems. Oil or grease in a bearing does not necessarily mean proper lubrication. Because of faulty design or wear, lubricants readily escape from the bearing surfaces of most mine equipment. It is often a problem to select a lubricant that will "stay put."

At the central shop experiments are made in the improvement of existing equipment. Loader shafts have been replaced in the Hiawatha shop by others of special alloy steel with which not a single failure has been experienced. Machine bit points have been given a coating of special alloy by the electric arc process, which multiplies their lives many times.

Abstract of paper presented at the Rocky Mountain Coal Mining Institute, Salt Lake City, Utah, March 12.

DRILLING AND BLASTING

How Problem Has Been Met In Southern Wyoming

By D. C. Foote

Mining Engineer
Union Pacific Coal Co.

WHEN mechanical loading was introduced into southern Wyoming, one of the main problems to be solved was the drilling and blasting of the coal. For such loading the coal must be completely freed from both ribs and shaken so loose at the back that when the machine advances the coal will fall forward without much pick work.

In order to blast coal satisfactorily for the loading machine more holes should be drilled and the size of the charge in each hole should be decreased. In this endeavor the placement of drillholes is one of the most important factors. This part of the blasting cycle requires careful, exhaustive study and constant supervision in order that maximum efficiency may be obtained from the explosive when the holes are shot. Safety also must be studied from all angles.

The method of charging drillholes varies somewhat at the several mines, though one rule is in effect at all—all power must be cut off the lines leading into the working place before the explosive is taken to the face and the drillholes are charged.

Cable reels are provided for the leading wires, which leads are unreeled just before the charges are detonated. When reels are used the temptation to leave the leading wires lying on the floor is removed and the wire is kept in much better condition. At the reel end of the leading wires the terminals are attached to sockets set in the rims of the spool.

A JUMPER is provided, equipped on one end with brass plugs for insertion in the reel sockets and at the other end with suitable terminals for connection with the 20- or 30-shot blasting machines. One workman of the crew remains with the blasting machine during the connecting and detonating of the drillholes; this precaution is taken to prevent any tampering with leading wires and battery while the charges at the face are being connected.

A preliminary survey of blasting conditions in No. 8 mine at Rock Springs indicated that in order to use in the drillholes the exact quantity of explosive desired a smaller unit than the ½-lb. cartridge must be employed. Tests made with 1x8-in. cartridges weighing 0.23 lb. per stick showed a saving of 15 per cent in explosives and a product of larger size, but this size was not adopted because it was thought that sticks of so small a diamerer might be too insensitive.

The next tests were made with 1¼x8-in. cartridges, the resulting saving showing about 7 per cent. The increased air space or cushion in the drillholes due to the use of permissible of smaller diameter appeared to be beneficial, for the coal was brought down in larger lumps.

In most of the working places (which varied in width from 12 to 16 ft.) three bottom and three top holes are drilled per round. The direction of the buster holes is changed according to the position of the slips in the seam. The rib holes are bored 12 to 18 in. from the rib line and 6 in. in the clear at the back. The upper rib holes are drilled as nearly parallel to the top as possible.

The charge varies from 1.0 to 1.4 lb. of permissible per hole; the stemming consists of clay, contained in paper blasting bags of 1½ in. diameter and 10 in. long. These bags are filled outside the mine by contract labor; the dummies are packed in powder boxes and delivered by the night shift to the loading units requiring them.

IN CHARGING the drillholes all cartridges are pushed to the back of the hole together; then two untamped dummies are put in; a third one is added; this is pressed slightly; the rest of the hole is tamped solid to the collar. The charges are detonated with electric blasting caps of No. 6 strength, the breaking holes with instantaneous caps and the ribs with No. 1 and No. 2 delays.

In long-face scraper work the holes are drilled in pairs, the distance between them varying from 6 to 12 ft. These holes are charged and fired whenever the scraper needs coal.

Two types of loading machines are used in No. 8 mine, 15- and 25-hp. Eickhoff shaking conveyors with duckbill and ratchet attachment, and the Goodman and Vulcan scraper loaders. Shaking conveyors are used in both development and recovery work, there being one unit on a long face just as on the scraper places. The scrapers are all used on the long face.

All coal for the shaking conveyors and scraper loaders is undercut with Goodman shortwall machines having

(*Turn to page 218*)

THE INTRODUCTION of mechanical loading has meant new problems in drilling and blasting. Rules which worked for hand loading have not always been adaptable to conditions under the newer era of mechanization. How these problems have been met in Utah and southern Wyoming by progressive companies was told at the winter meeting of the Rocky Mountain Coal Mining Institute at Salt Lake City last month by Messrs. Foote and Peterson, whose addresses at that meeting are here abstracted.

for Mechanical Loading

Utah Shoots Machine Coal With Delay Caps

By H. Peterson
Explosives Engineer
Hercules Powder Co.

PICK mining and hand-loaded coal have given way to machine-mined and mechanically loaded coal; black powder has been supplanted by permissible powder and changes have been necessary at every working face. In many cases the operator has unnecessarily sacrificed coal quality to machine efficiency. The loading cost per ton has been reduced but the percentage of slack has been increased, resulting in lower net profit.

The seven rules which follow are adaptable to all machine-mined coal but they will be considered here only in their application to operations where coal is mechanically loaded.

(1) *The proper location of holes is one of the important factors in all blasting.* Holes should be drilled parallel to and between 8 and 18 in. from the ribs, as nearly horizontal as possible and all at the same height. A hole that is pointed into the rib requires an excess of powder, increases the likelihood that the shot will be blown out and produces an excessive percentage of slack.

When several holes are drilled from one set-up, the round of holes assumes a fan shape with the powder improperly balanced. This is not good practice. To change a set-up requires only about two minutes, for which time there is more than compensation in the increased efficiency of the explosive and in the decrease of the percentage of slack.

(2) *Remove all bugdust from the kerf.* The Safety Code adopted by the Rocky Mountain Coal Mining Institute, section 30-b, says:

> Machine cuttings should be thoroughly removed from the kerf before shooting. With failure to remove such cuttings shooting out of the solid is closely approximated.

(3) *Clean all drillings from boreholes.* When some of these are left not only is there danger of their becoming ignited but there is a certainty that the powder will not be placed at the far end of the hole. There is a possibility also that some of the cuttings will fall between the sticks of powder, thus preventing some of the cartridges from being exploded. In that event all or a part of the shot may be left standing.

(4) *All holes should be drilled 6 in. short of the undercut.* If they are drilled longer an excessive quantity of powder is required and in many cases coal will be left standing or the shot will blow out.

(5) *Load all the powder in the borehole together.* When one stick is loaded at a time a small quantity of coal may get between the stick of powder, causing some of it to escape detonation.

(6) *Properly tamp and stem all holes.* It has been found advisable to push the powder gently to the end of the hole, to place the first 18 in. of dummy lightly against this powder and then to add other dummies, tamping more and more vigorously with increased distance from the powder.

(7) *Never drill holes before undercutting.*

* * *

IN order to improve the grade of coal and decrease the percentage of slack it was found advantageous in many cases in Utah when permissible explosives were introduced to use delay and instantaneous caps. The introduction of mechanical loading made further changes in shooting methods necessary. The delay electric blasting cap was more necessary than ever. The coal had to be broken by shooting in such a degree that the mechanical loader could handle it efficiently. No excessively large lumps should be produced and yet there should be no excess of slack. The coal also should be thrown out so as to assist the loading machine.

When shooting for mechanical loading it was necessary to increase the number of holes in the face and to decrease the quantity of powder

Fig. 1—Shot-Placement Diagram, 26-Ft. Face; Numbers Under Holes Indicate Time Length of Delay Detonators

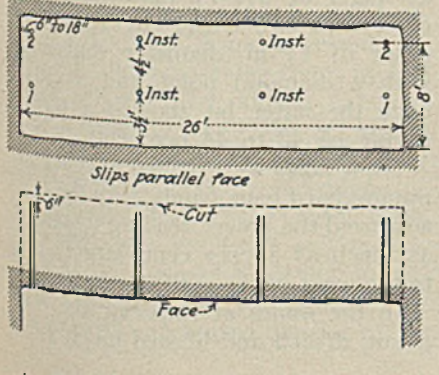


Fig. 2—How Shots Are Placed in Entries

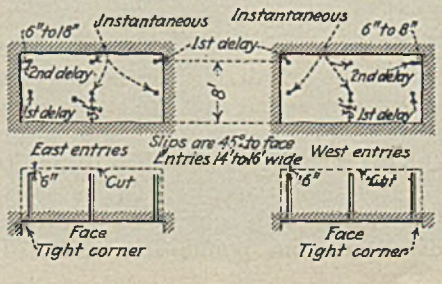
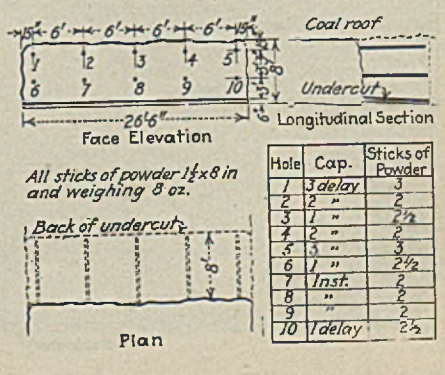


Fig. 3—As Coal Is Massive Ten Holes Are Used



Hole	Cap.	Sticks of Powder
1	3 delay	3
2	2 "	2
3	1 "	2½
4	2 "	2
5	3 "	3
6	1 "	2½
7	Inst.	2
8	"	2
9	"	2
10	1 delay	2½

per hole. The footage of the holes had therefore to be increased 30 to 60 per cent without materially increasing the quantity of explosive used.

Fig. 1 shows a room 26 ft. wide and 9 ft. high driven so that the slips are parallel to the face. A standard round of eight holes is used with the upper four holes 12 in. from the roof and the bottom four about 3½ ft. from the floor. The rib holes are about 12 in. from the ribs. All holes are drilled 6 in. short of the depth of mining. Instantaneous electric caps are placed in the four center holes, first-delay caps in the bottom rib holes and second-delay caps in the top rib holes. This system does well in this mine, where the rooms are 20 to 26 ft. wide and 7 ft. to 9 ft. high. Where they are wider a 10-hole round should be used.

Fig. 2 shows east and west entries in the same mine, which are from 14 to 16 ft. wide and 7 to 9 ft. high. The slips are at an angle of 45 deg. to the face. A 6-hole round is used, and the holes are located much as in the rooms. In the west entries the tight corner is on the left side and it has been found advisable to shoot the lower or left corner hole and the center, lower and top holes with instantaneous caps, followed by the right and left upper holes with first-delays and the right upper with a second-delay. This condition is reversed in the east entries, where the tight corner is at the right. In these rooms and entries a coal roof is left.

Fig. 3 is the placement diagram adopted in another district where the coal is massive without pronounced cleavage. Though the rooms are only 26 ft. wide and the coal 8 ft. high a 10-hole round has been found to give best results. An 8-ft. cutter bar is used. The three center bottom holes are shot with instantaneous caps, the bottom rib holes and the center top hole with first-delays, the two remaining center top holes with second-delays and the two top rib holes with third-delays.

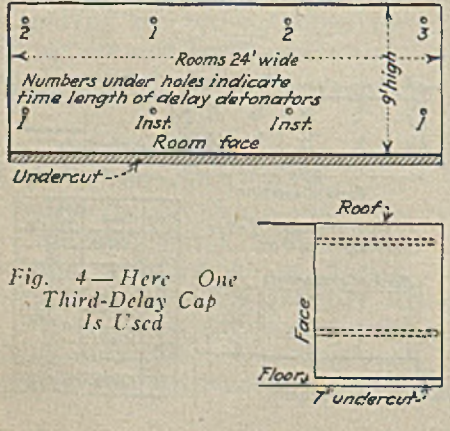


Fig. 4—Here One Third-Delay Cap Is Used

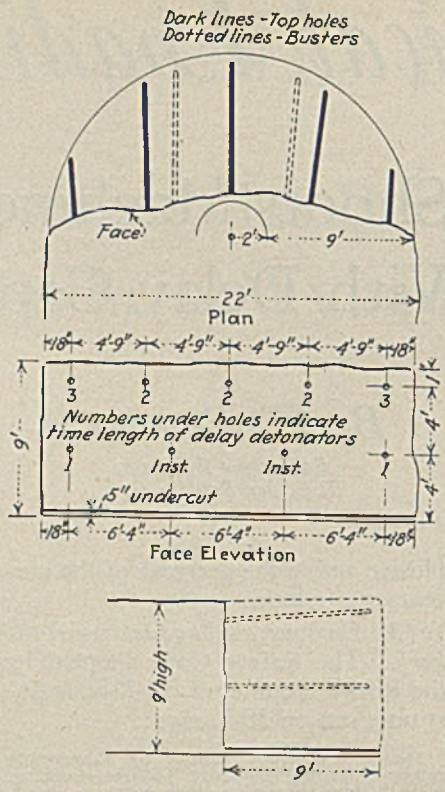


Fig. 5—Arcwall Face With Two Third-Delay Cap Shots

Fig. 4 shows a placement diagram adapted to another district where there is a bone parting in the roof and 9 ft. of coal. A standard round of eight holes is drilled, but the four bottom holes have been lowered to within 3 ft. of the floor, leaving 5 ft. between top and bottom holes. The two lower center holes are shot with instantaneous caps, the two lower rib holes and one of the center top holes with first-delays and the other center hole and the opposite rib hole are shot with second-delays. The other upper rib hole is shot with a third-delay.

IN Fig. 5 are shown the locations of the drillholes used in another district where the coal is cut by an arcwall machine equipped with a 9-ft. cutter bar. The rooms are 22 ft. wide and 9 ft. high. At this mine the production of lump coal is not a factor. A 9-hole standard round is used with four holes in the bottom and five in the top. The two bottom center buster holes are fired with instantaneous electric caps, the left bottom and right bottom with first-delays, the three center top holes with second-delays, the left top and right top rib holes with third-delays.

An important point is the quantity of powder used. The popular unit seems to be a full stick of powder. Sticks are rarely cut so that a half stick can be used. In many places a stick and half is sufficient but two sticks will be loaded, or again two and a half will serve but three are used, causing in each case an overloaded shot which unnecessarily shatters the coal.

How Problem Has Been Met In Southern Wyoming

(*Continued from page 216*)

7- to 8-ft. cutter bars and drilled by Little Giant electric breast drills, the holes being of 2½ in. diameter.

Recently the shape of the drill bits used in the mine was changed. Formerly, after the tips of the bits had been split a chisel edge was made on each of the two wings, but with the new type only one wing is given a chisel edge; the other is drawn to a diamond point, the latter leading the former about ⅛ in.

HOLES of equal diameter were drilled with bits of both types and it was found that the auger with two chisel edges required 2 amp. more current than the other, thus using 20 per cent more power. Tests were then made with augers of different diameters and points—one drill of $2\frac{5}{16}$ in. diameter with a chisel edge and a diamond point, the other of 1½ in. diameter having two chisel edges. The power readings taken during the drilling of the two holes were almost identical although the cross-sectional area of the larger hole is 2.3 times that of the smaller. With an auger of $2\frac{5}{16}$ in. diameter sharpened with two chisel edges and another of 1½ in. diameter sharpened with a diamond point and a chisel edge the latter bit showed a power saving of 40 to 44 per cent.

Some holes were drilled in coal containing hard bone bands. As the drill advanced the power reading increased as much as 53 per cent, largely due to the wear in the cutting edge.

In the mines at Superior the coal is cut, drilled and blasted much as at

Rock Springs. It is undercut with Jeffrey shortwall machines having 7- to 8-ft. cutter bars. Little Giant electric breast drills are used for the boring of holes.

THE coal seams at Superior differ somewhat from those at Rock Springs. The coal is more friable and has many slips and cleats. Its thickness varies from 6 to 8 ft., with rock and bone bands at 3 to 14 in. The loading machines are of the shaking-conveyor type with duckbill and ratchet attachments; the Eickhoffs have 5-, 15-, and 25-hp., and the Mavor & Coulson 15- and 30-hp. drives. All development (with the exception of sinking slopes), all room driving and pillar recovery are done with these conveyors, and in parts of the mine they are working successfully under bad roof.

Rooms are driven up the pitch and 20 to 24 ft. wide. Crossbars 20 ft. long are set after each cut. These have four or five center posts and from them forepoles are extended to the face. In the working places that have bad top particular attention must be given to the placing and charging of the drillholes, for an excessive charge of explosive will not only damage the top but may displace crossbars and props, causing a heavy fall of rock. Frequently it is necessary to shoot only the center top shot, clean out the coal and place forepoles in the opening before firing the other top shots.

Two kinds of permissible powder have been used at these mines, one with a unit deflective charge of 249 and a rate of detonation of 6,400 ft. per second, the other with a unit deflective charge of 217 and a velocity of 8,230 ft.; both permissibles have 1½x8-in. cartridges of ½-lb. weight.

A preliminary survey of blasting operations revealed a general tendency to overcharge drillholes, resulting in a high explosive cost and an excess of fine coal. From information gained during this survey it was decided that the weight of the cartridges should be reduced, so two explosives were selected for testing purposes, one having a u.d.c. of 223 and a velocity of 6,330 ft. and a cartridge count of 160 sticks per case, the other a u.d.c. of 222, a velocity of 9,050 ft. and a count of 185, both permissibles being received in the 1¼x8-in. cartridges.

Extensive tests have been made with the latter explosive and the results show a possible saving in explosive cost of 40 per cent. This test explosive increased the size of the coal and made cleaning easier because the rock bands were not broken down as much.

The smaller-diameter sticks allow an increase in the air space around the cartridge and in connection with two or three untamped dummies give the desired cushioning to the shots. With the use of an explosive of lesser density the tendency to overshoot the coal is reduced because if one stick too many be used the shattering effect is not as great as with a denser permissible.

The coal seam at Hanna No. 4 is 32 ft. thick, pitching at about 18 deg. to the horizontal. Only two small partings or bands of impurities appear in the part of the seam worked. The coal has a woody structure with no regular slips or cleats. Of the seam 26 ft. is mined; the top 6 ft., which is unmarketable, is left as roof protection.

Four types of loading machines are in use—Joy loaders for developing rooms, Thew shovels and Vulcan scrapers for the recovery of top coal, Eickhoff conveyors equipped with duckbills and ratchets for the development of panel planes. The coal is undercut with Sullivan shortwall machines having 8-ft. cutter bars and is drilled with a one-man 26-lb. Van Doren electric breast drill.

THE mine is worked on the panel system; 1,000 ft. rooms are driven on either side of the panel; these rooms are 24 ft. wide, 8 ft. high and with the bottom cut level.

Many tests were made in these rooms to determine a round of holes that would free the coal from the ribs and corners and bring it down in a size that could be loaded easily by Joy machines. A fourteen-hole round was finally adopted, seven holes at the bottom and seven at the top; the rib holes are drilled 18 in. from the rib and 6 in. in the clear at the back, the bottom ones 3 ft. 3 in. from the floor and pitched slightly downward. The top holes are drilled as nearly level as possible; all holes are kept on a straight line.

The drillholes are charged with a permissible gelatin explosive using 1x8-in. cartridges having a rate of detonation of 15,250 ft. per second and a u.d.c. of 259. The holes are tamped solid from the explosive charge to the collar, leaving no air space, because the cushion method of tamping the holes was found to be detrimental rather than helpful in blasting down the coal.

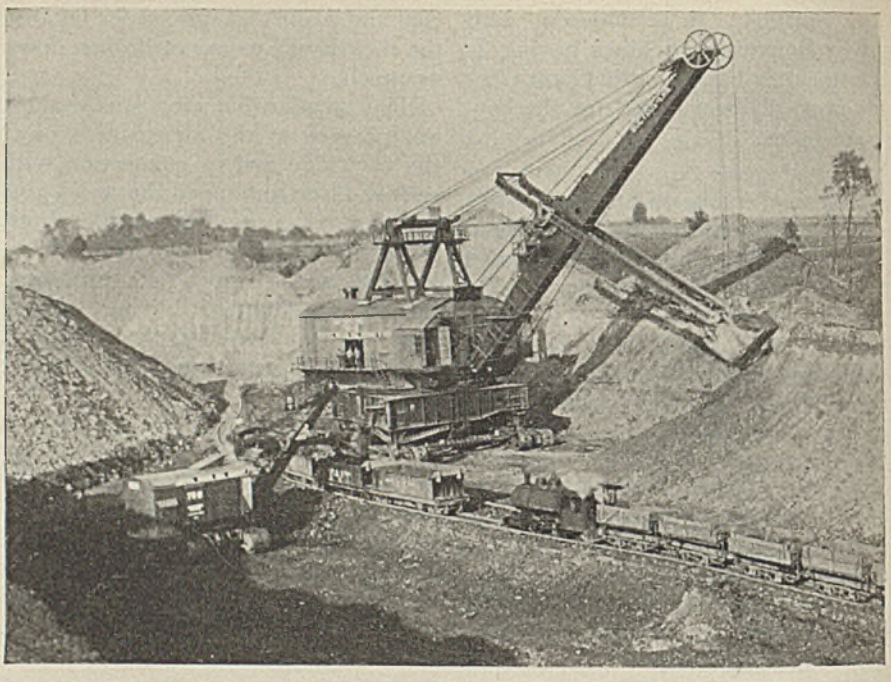
After Joy loaders have driven the rooms to the desired limits the top coal, or 19-ft. seam, is recovered with Thew shovels. For the smaller Thews the coal is worked in three benches, the lower bench advancing 20 to 30 ft. ahead of the one above. The average round of holes in each bench consists of six or seven 10-ft. holes drilled level; these holes are charged with 1x8-in. cartridges.

IT IS the purpose always to blast this coal in sizes that can be handled by the shovel without resorting to the plugging of large lumps. The coal is compact and it is difficult with a pick to separate large chunks from a mass of the coal; if any lumps too large to be loaded by the shovel are blasted down these must be drilled and broken with pop shots.

The top coal in rooms worked with the large Thew shovels is shot in two benches; the average round for each bench consists of six or seven 10-ft. holes drilled level. These holes are charged with 1x8-in. cartridges of permissible gelatin explosive. These shovels are able to break down lumps that are too large to load. For this reason the coal need not be blasted so small as when it is being prepared for the small Thew.

Utah Coal Brought Down by Delay-Cap Shooting

Future of Stripping Industry



Dictates Modernization Program at Allendale

By J. H. Edwards
Associate Editor, Coal Age

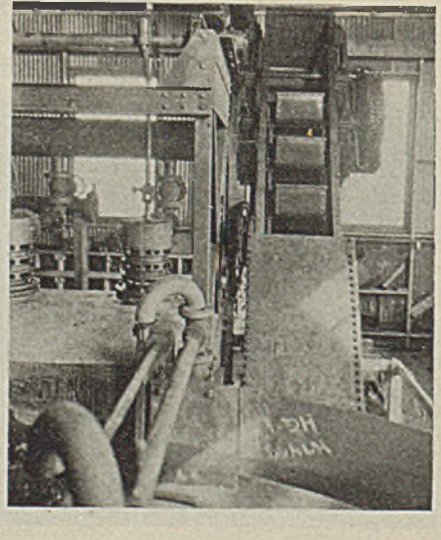
CONSIDERATION of the future of the industry was the guide in modernizing the strip pit and preparation plant at the No. 2 Allendale strip mine of the Central Indiana Coal Co., near Dugger, Ind. Not only has mechanization been utilized to increase production to a point where coal may be mined and marketed at present prices but reliance has been placed on it also to produce a better grade of coal.

Allendale No. 2 mine is the second to be operated by the Central Indiana company, the pioneers in stripping in Indiana. In 1917 this company opened the Robin Hood pit, which is still operating, and in 1919 installed the first commercially successful washery in the state—an Elmore jig in which it cleaned its 1¼-in. screenings. No. 2 pit was originally opened with steam-driven equipment. Two Elmore jigs were installed in the tipple to wash everything below 4 in. Last year the steam equipment was displaced by electric, increasing the capacity of the pit from 1,200 tons per day to 2,000. A Link-Belt-Simon-Carves wash-box was installed to clean the 1¼-in. screenings.

The seam mined is the No. 6, which at No. 2 mine has an average thickness of 5 ft. and contains three 1-in. fireclay partings and some pyrites. The bottom is of fireclay and in many places intrusions of the same material partly or wholly displace the coal. Being soft, the fireclay breaks up into small pieces.

At the present time an area containing four million tons of coal is being opened. Before operations were commenced diamond-drill holes, spaced 200 ft. apart, were sunk and cores obtained for analysis and inspection. Following this work, test pits were made to permit of a more accurate analysis of the coal and an inspection of the strata. From the most representative of these test pits sufficient coal was mined for actual firing tests in steam and household furnaces.

There Is a Refuse Elevator at Each End



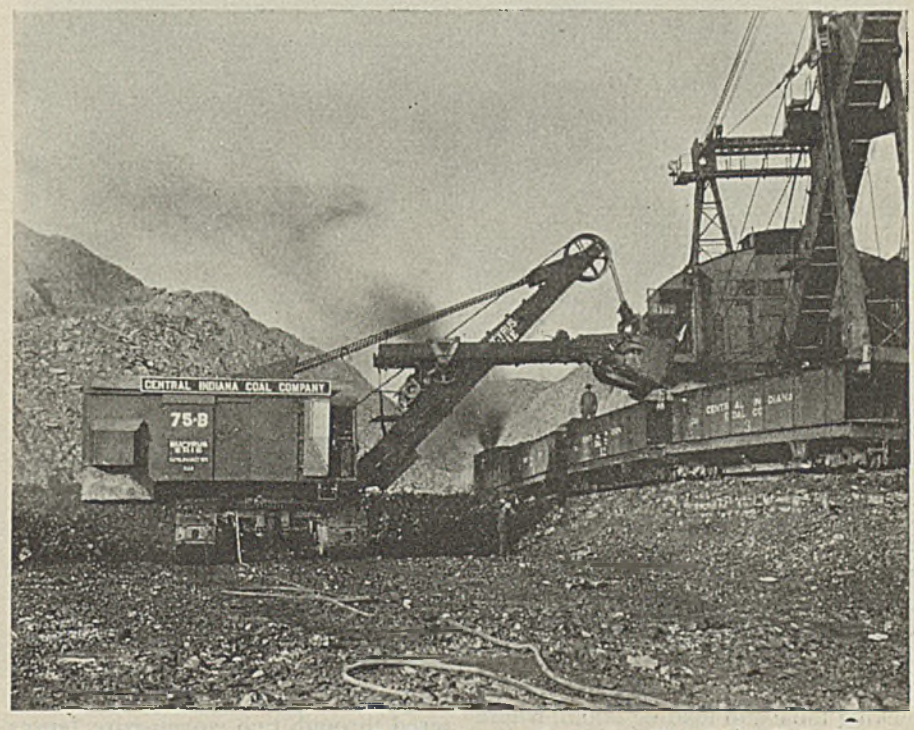
Overburden in the new area is from 18 to 50 ft. thick, the average thickness being 35 ft. At present the shovel is working with about 30 ft. of cover, which in some places contains a hard shale difficult to dig. In accordance with general practice, the overburden is not being shot, but, as stripping progresses, certain areas where heavy rock is encountered will require blasting.

The cover is stripped with a Bucyrus-Erie 750-B electric shovel having a 12-yd. dipper. This machine replaces the Bucyrus 225-B 6-yd. steam shovel formerly used. The complement of the "big stripper" just described is a Bucyrus-Erie 75-B 3¼-yd. electric coal-loading shovel, which replaces the Bucyrus 35-B steam coal loader. Both machines are equipped with caterpillar treads to facilitate movement. Three men are required to operate the 12-yd. stripper and two men the coal-loading shovel. The latter machine is power-

ful enough to remove the coal without blasting, thus cutting powder costs and increasing the percentage of lump coal.

Four steam locomotives, each with 11x16-in. cylinders, have been retained from previous operations to transport coal to, and refuse from, the tipple. The coal is loaded into Sanford-Day all-steel 15-ton automatic bottom-dump cars. Sixteen of these are in use. They are handled in trains of five cars each, one extra car being kept in reserve and substituted for "repairs" or "bad-orders." Hand labor for moving material is completely eliminated. Instead of a crew of six or seven men to clean the top of the coal with wire brooms and to skid track, one man operating a McCormick-Deering gasoline caterpillar tractor with shovel attachment cleans the worst of the muck off the coal and pulls or pushes the track to its new position.

From the pit the coal is delivered to a 100-ton capacity concrete hopper in the tipple, which latter was remodeled in 1928 to take care of the increased production. This remodeling included the addition of the Link-Belt-Simon-Carves washer mentioned above, which eliminates the refuse which the modernization of the strip pit introduces. The use of loading equipment of greater power and higher capacity makes it imperative that the refuse be less carefully separated in the pit, thus throwing the burden on the tipple. The 3¼-yd. coal-loading shovel, according to R. H. Sherwood, president of the Central Indiana company, was the first of such size to be put in use and with its capacity it is not economical to allow it to "dribble around" trying to separate coal from muck. With adequate washing equipment the coal loader can afford in an effort to avoid wasting any of the coal to load part of the bottom fireclay, a little of spoil or some of the many rolls in the clay bottom.



A 3¼-Yd. Dipper Loading Into 15-Ton Drop-Bottom Cars Equipped With Loose Wheels and Timken Bearings

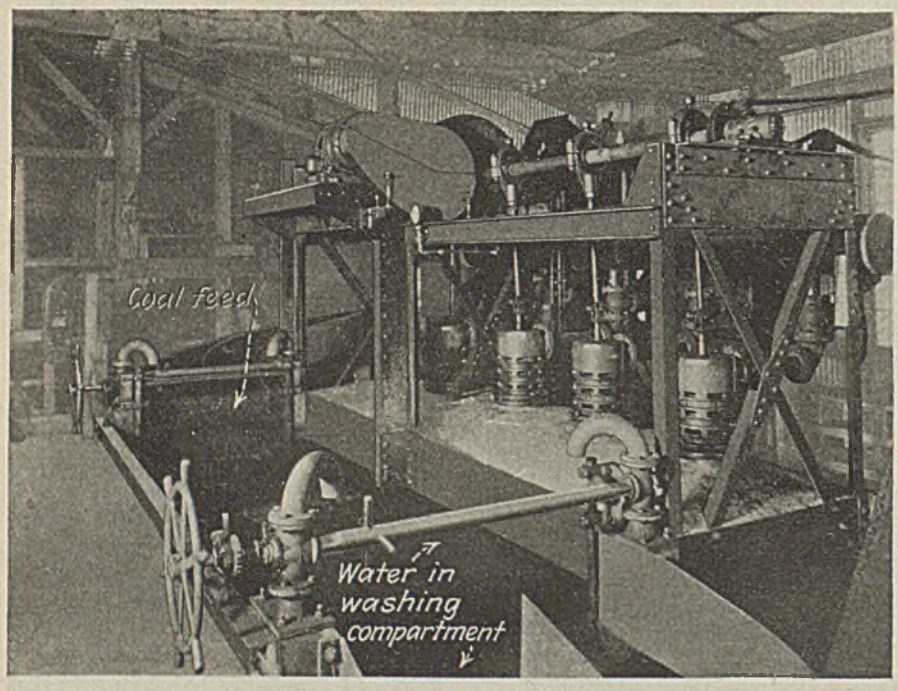
From the concrete hopper the coal is conveyed to the shaker screen and separated into 1¼-in. screenings, 4 x 1¼-in. egg, 4 x 6-in. egg and 6-in. lump. The percentages of screenings and sizes above and below 4 in. are about equal, the egg being handled in the two Elmore jigs and the 1¼-in. screenings in the Link-Belt-Simon-Carves washer.

Dumping Washery Waste Into the Mined-Out Area In the Allendale Pit

At Allendale No. 2 the Simon-Carves washer cleans from 600 to 700 tons of 1¼-in. screenings per shift, or an average of 85 tons per hour. The rated capacity is 100 tons per hour, but, according to officials, it may be crowded to 120 tons without material loss in efficiency. The raw screenings are delivered to the wash-box by a short belt and after being washed are discharged in flumes, which carry them to the vibrating dewatering screens. These are of wedge-wire construction with ½-mm. openings. From them the coal is discharged into the car-loading hopper.

The original tipple was equipped with two Elmore jigs for cleaning coal below 4 in.; in the rearranged layout these jigs have been retained so as to keep cost of alterations to a minimum. The Elmore jigs are now handling the 4-in. to 1¼-in. coal, and an up-to-date Link-Belt-Simon-Carves washer has been installed to handle the 1¼ x 0-in. coal.

Egg coal is washed in two Elmore jigs, which are fed from two hoppers. Coal is carried from the shaker screens by a belt conveyor which empties into a flight conveyor; the latter elevates it and discharges it into the jig hoppers. The washed egg



Top View of Simon-Carves Unit

coal from the jigs is elevated to a Link-Belt flexible support shaking screen, where water is introduced at one end to rinse the egg. It is dewatered by this same screen and passes to the loading hopper.

Lump coal is discharged onto a picking table and loading boom, where it is hand-picked. The chutes are so arranged that it is possible to mix washed egg with 4-in. lump or to mix 4-in. lump with washed screenings and egg, making a washed mine-run product.

Tests on the washed screenings made when the plant was put into operation in October last gave the following results: Coal tested on a specific gravity of 1.50, floats 97.5 per cent; sink, 2.5 per cent. This latter material contained 30.3 per cent ash, which proved it to be a mixture of coal and refuse. The sinks in refuse contained 77.1 per cent ash. The ash in screenings varies somewhat and runs out between 8.5 per cent and 9.06 per cent ash on the test gravity of 1.50.

One man is employed to check the washing results obtained in the Simon-Carves washer operating on the 1¼-in. screenings, and the egg and nut from the Elmore jigs. He employs a Delatester carrying a solution of 1.50 specific gravity. With frequent tests being made daily, the high standard of washing is checked and maintained continuously without risk of variation.

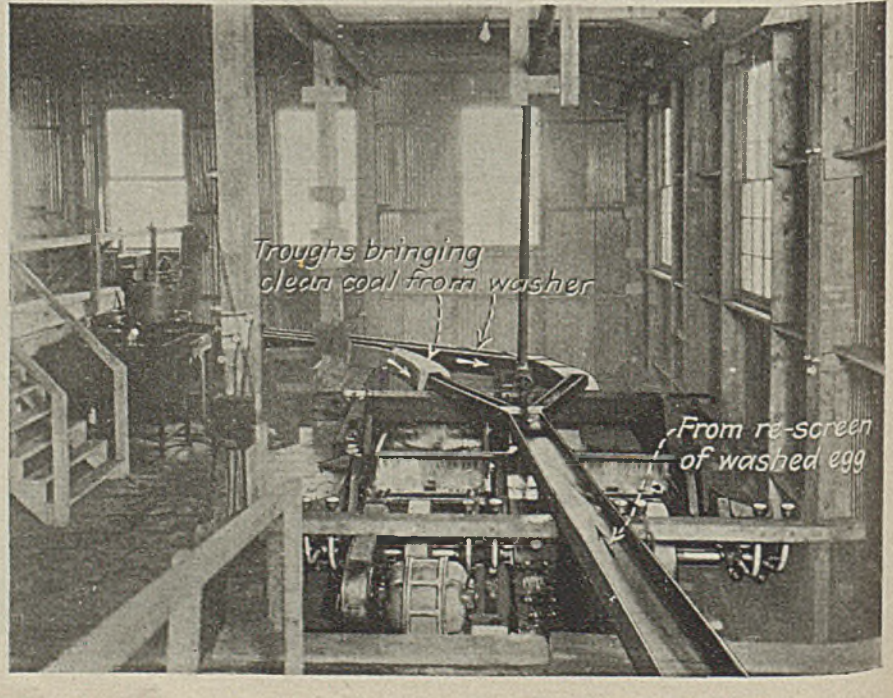
The total reject from the tipple, including refuse from the picking table and Elmore jigs, is 18 to 20 per cent of the total product loaded in the pit. This refuse is loaded into side-dump cars, hauled back to the pit and dumped in the mined-out area behind the coal loader.

No provision is made for the recovery of the sludge, the wash water being discharged into a pond and filtered through two woven-wire fences banked with straw. Make-up water for the Simon-Carves washer is supplied through sprays that impinge on the dewatering screen. The collective horsepower on the washer is 48 and that on the dewatering screen is 10. Three motors are necessary to the washing operation, one at 18 hp. driving the centrifugal air compressor, one at 20 hp. for the circulating pump, and a third 10-hp. unit for operating the air pistons, valves, sludge screws and refuse conveyor to the wash-box.

According to W. H. Stewart, general superintendent, the chief advantages of the Link-Belt-Simon-Carves system are cleaner coal and larger capacity per unit. Others were, in order, lower maintenance cost due to fewer and slower moving parts; decrease in adjustment required during operation; elimination of the expense and worry of changing stroke, and no need for the presizing of coal below 1¼ in. The latter item is important, as Mr. Stewart contends that "there is no fine-mesh screen made which will not plug with the wet fireclay with which we have to contend."

Speaking further, Mr. Sherwood stated that, because of the refinement of design and slow-moving parts of the Simon-Carves washer, the repairs were small and only one attendant was needed. When asked about the cost of washing coal, he said that it was almost impossible to determine what this cost was. The charges against washing were the costs of attendance, upkeep and amortization of investment, plus loss in refuse removed from the coal. The items to offset these are the added realization from washed coal, plus the savings that may be effected when, owing to the use of a washer, the coal can be loaded in the pit without excessive precautions. Obviously, these credits to the washer are important but of such a nature that they cannot readily be converted into concrete figures in the form of cents per ton.

Dewatering Screens of Wedge Wire

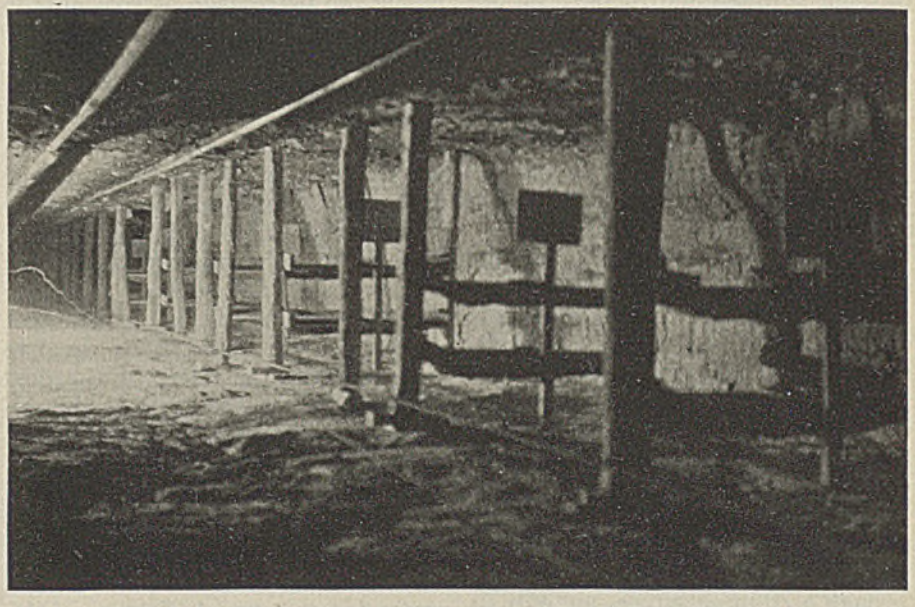


Where Coal Dust Is Fine

75 Per Cent of Inerts May Be Insufficient

By F. C. Miller

Chief Chemist, Fuel Department
Colorado Fuel & Iron Co.
Trinidad, Colo.



Rock-Dust Barrier at the Valdez Mine

SPECIFICATIONS adopted by Great Britain and approved by the experience of the U. S. Bureau of Mines require that 100 per cent of the rock dust used for protection against mine explosions shall pass a 20-mesh screen and 50 per cent through a 200-mesh screen. This will serve in general contact dusting, but when treating entries by blowing dust by pressure through a crosscut and depending on the velocity of the ventilation to carry the suspended material along to the point reached from the next point of approach, 100 per cent should pass through a 100-mesh screen and 85 per cent through one of 200-mesh.

Fine dust of 200-mesh will absorb less moisture than coarser dust when placed on the shelves of a barrier. Only the fine particles of dust that will be easily held in suspension by the current of air generated by the explosion will be effective in its extinction.

Just why rock dust prevents the extension of a coal-dust explosion is not understood. The suspended rock dust and coal dust will reduce the percentage of oxygen in the air. But such an admixture would require close to 19 per cent of suspended dust to reduce the oxygen to 17 per cent, at which point an oil lamp will be extinguished. Such a percentage of dust could be reached only at a rock-dust barrier and for an instant.

But consideration should be given to the gas liberated from the coal already heated to the point of dissociation and easily burned in an atmosphere of 17 per cent oxygen. Doubtless the radiation of heat is reduced by the fog of suspended dust. Furthermore, the few grains of moisture in the air are heated in a zone exceeding 212 deg. F., extracting 966 B.t.u. from the air per pound of water. Then again the inert dust particles absorb heat. Thus the coal dust and rock dust are reduced in temperature below 800 deg. F., the ignition point of bituminous coal and air.

The rock dust in the mine should be sampled in three parts, certainly in not less than two. A path 4 in. wide should be carefully brushed into a pan starting at the bottom of the left rib across the top and down the right rib to the bottom. Then a sample should be taken across the roadway or bottom. A third sample should be taken along a crossbar close to the section where the other samples were taken.

These samples should be screened separately at the point of sampling with a nested outfit consisting of a bottom pan, a 20-mesh screen, one of 10-mesh and a tight-fitting cover, the 10-mesh screen being used to take the load off the 20-mesh screen and protect the mesh. The samples are then reduced in volume by quartering and placed in Dupont or Hercules blasting-cap containers and sealed with friction tape to hold the moisture.

These samples are then tested. This may be done in four ways:

(1) The sample may be pulverized to 60-mesh and its color compared with that of a standard series of bottles containing a known percentage of inert matter of a similar character to that used in the mine.

(2) Its specific gravity may be determined as a means of ascertaining its percentage of inert matter and coal, the specific gravity of each being known.

(3) A certain known weight of the prepared sample may be burned in a muffle furnace correcting for oxidation and the loss of carbon dioxide by the carbonates. This is the analytic method and it is presumed to be correct.

(4) The sample is exposed to flame in excess of the ignition point of firedamp, 1,500 deg. F., in a current of 5,000 ft. per minute. Tests on prepared samples can be made at the rate of 30 per hour. The results are graded from pure coal to pure rock dust and are reported as (a) extremely violent (b) violent (c) fairly explosive (d) slightly explosive (e) no reaction.

THE results thus obtained seem to confirm the tests on coals available for testing made by the Bureau of Mines in the explosives gallery at Pittsburgh and to confirm its con-

Paper presented at the Rocky Mountain Coal Mining Institute at Salt Lake City, Utah, March 11.

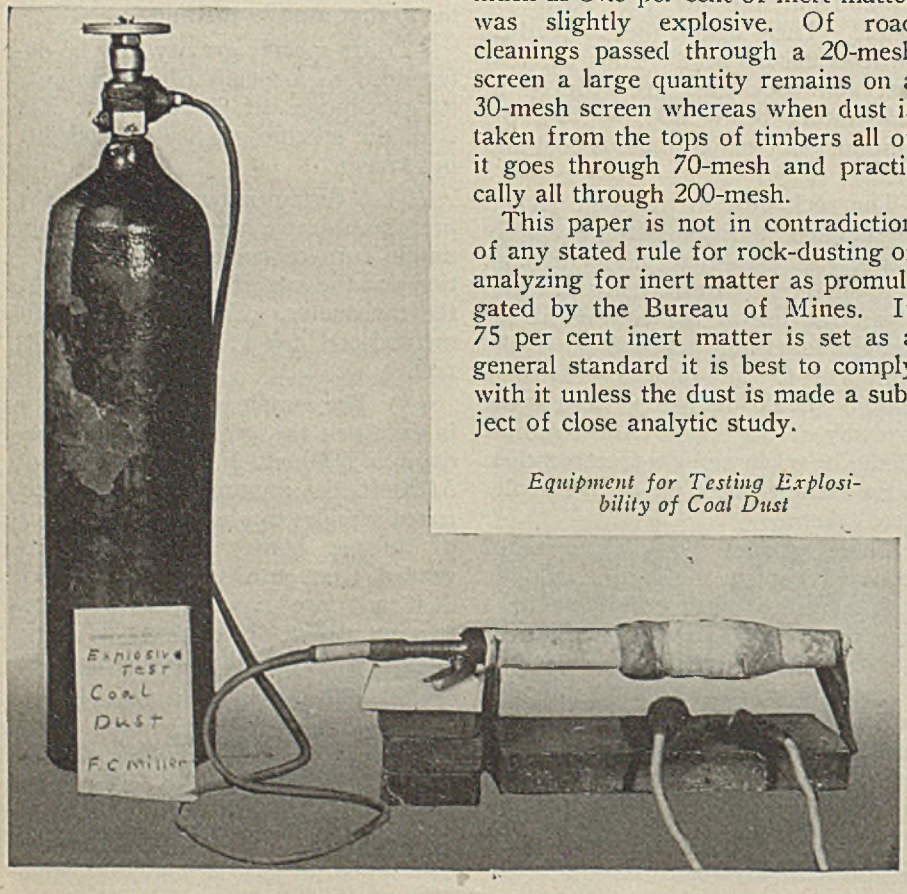
clusions as to the minimum quantity of inert matter which will insure against ignition of coal dust under mining conditions and in the presence of heat that would cause coal dust to ignite or explode. A few laboratory tests are presented in Tables I-VII.

Apparently coal particles passing through 20-mesh and retained on 30-mesh cannot be regarded as playing a serious part in an explosion. This is corroborated by the action of pulverized coal in a boiler. Particles of pulverized coal of this size remaining on a 30-mesh screen pass the oxygen zone without complete combustion and are found in the ash as coke.

The heading, from which came the sample described in Table III, was redusted because its proportion of inert dust was only 61.2 per cent. However, the explosive test shows that the percentage of dangerously fine dust was so low that the heading could have been left with safety for some weeks without rock dusting.

These mutually corroborative demonstrations show most clearly the danger of the coal dust passing through a 70-mesh screen, not only in itself but as a detonator of dust under favorable conditions.

From Table VII of the nested-screen test it is clear that 66 per cent of the 20-mesh coal dust passes through the 30-mesh screen.



Equipment for Testing Explosibility of Coal Dust

If, as has been suggested, the portion passing through 20-mesh and held upon 30-mesh—namely, 34.1 per cent—is inactive then the 66 per cent of the coal dust passing through the 20-mesh screen should show the same results as the actual screened coal dust through 30-mesh. In Table IV, for instance, the figure 50 per cent giving the percentage of coal dust in the test will have 66 per cent of 50 per cent, or 33 per cent of coal passing through a 30-mesh screen. In Table V the coal is dust screened through 30-mesh and it is seen that where there is 30 per cent of coal dust a slight explosion occurs just as it does when there is 50 per cent of dust which passes through a 20-mesh screen. To take another example: As 66 per cent of the 60 per cent of coal dust in Table IV is equal to 39.6 per cent the effect of the dust should be about the same as the 40-per cent coal dust in Table V. It will be noticed in both cases the explosion was violent.

CLEARLY the percentage of inert matter as tested on a 20-mesh screen is not a true indication of the explosibility of mine dust. I have found a sample of dust from road cleanings that had only 39.7 per cent inert matter would not explode whereas a sample of dust taken from the tops of timbers which had as much as 84.5 per cent of inert matter was slightly explosive. Of road cleanings passed through a 20-mesh screen a large quantity remains on a 30-mesh screen whereas when dust is taken from the tops of timbers all of it goes through 70-mesh and practically all through 200-mesh.

This paper is not in contradiction of any stated rule for rock-dusting or analyzing for inert matter as promulgated by the Bureau of Mines. If 75 per cent inert matter is set as a general standard it is best to comply with it unless the dust is made a subject of close analytic study.

Table I—Raw Coal Prepared to Pass 40-Mesh Screen

All samples with less than 10 per cent ash

Kind of Coal	Nature of Coal	Explosion
Anthracite	Colorado Fuel & Iron Co.	None
Bituminous	Strong coking	Extremely violent
Bituminous	Weak coking	Extremely violent
Bituminous	Semi-coking	Violent
Sub-bituminous	Non-coking	Violent
Lignite	Combined water, 26 per cent.	Very slight
Lignite	Same sample, dry	Violent

Table II—Shows Increased Violence with Increasing Fineness of Dust

Dust from a Strong Coking Coal Through 20-Mesh Screen

Moisture	1.70	Sulphur 0.54
Ash	14.57	B.t.u. Dry 13,084
Volatile Matter	28.96	.....
Fixed Carbon	54.77	.....
Total	100.00	

Through	Retained By	Explosion
20-mesh	.....	Violent
20-mesh	30-mesh	None
30-mesh	70-mesh	Fairly explosive
70-mesh	100-mesh	Violent
100-mesh	200-mesh	Extremely violent
200-mesh	.....	Explosive violence

Table III—Shows Inactivity of Coarse Dust

Dust from Rock-Dusted Electric Haulage Road Ash 61.20 Per Cent

All through 20-mesh	No explosion
All through 40-mesh	Violent explosion

Working on the theory that particles through 20-mesh and remaining on 30-mesh are not dangerous a screen test gave the following results:

29.70 per cent remained on 30-mesh screen	Ash 22.10 per cent
70.30 per cent passed through 30-mesh screen	Ash 78.20 per cent
Portion through 20-mesh and retained on 30-mesh	No explosion
Portion through 30-mesh	No explosion

Table IV—Instance Where 60 Per Cent Rock Dust Would Suffice

Coal Dust Through 20-Mesh, Ash 14.5 Per Cent
Rock Dust Through 100-mesh, Ash 100 Per Cent

Coal Dust Per Cent	Rock Dust Per Cent	Ash	Explosion
10	90	91.45	None
20	80	82.90	None
30	70	74.35	None
40	60	65.80	None
50	50	57.25	Slight
60	40	48.70	Violent

Table V—Here 70-per Cent Rock Dust Does Not Suffice

Coal Dust Through 30-Mesh, Ash 14.5 Per Cent
Rock Dust Through 100-Mesh, Ash 100 Per Cent

Coal Dust Per Cent	Rock Dust Per Cent	Ash	Explosion
10	90	91.45	None
20	80	82.90	None
30	70	74.35	Slight
40	60	65.80	Violent

Table VI—Even 80 per Cent Inert Matter Fails

Coal Dust Through 200-Mesh, Ash 14.5 Per Cent
Rock Dust Through 100-Mesh, Ash 100 Per Cent

Coal Dust Per Cent	Rock Dust Per Cent	Ash	Explosion
10	90	91.45	None
20	80	82.90	Violent
30	70	74.35	Extremely violent

Table VII—Nested Screen Tests on Coal Dust in Tables IV-VI

Dust Remaining On	Percentage
20-mesh	0.00
30-mesh	34.10
70-mesh	37.90
100-mesh	9.90
200-mesh	9.40
Dust Passing Through 200-mesh	8.70
	100.00

Good Cleaning Equipment . . . Yes . . . But Is That All?

By Paul Sterling

Mechanical Engineer,
Lehigh Valley Coal Co.,
Wilkes Barre, Pa.

MORE stress should be laid on the purity of anthracite than on its appearance. It should be sold on the basis of its ash content. By the adoption of this policy much low-ash bony now gobbed in the mines, also many laminated and slaty-faced pieces which are now condemned on appearance could be reclaimed. To obtain an idea of the saving this would accomplish I selected a run-of-mine sample and after removing the impurities by hand I crushed the larger size to egg-and-smaller and mixed this product with the rest of the sample.

The mixture was screened into egg to pea sizes, inclusive and submitted to an expert coal inspector to separate it on the one hand into merchantable coal acceptable to the critical trade and on the other into refuse. Approximately all material at 2.0 sp.gr. passed as commercial coal of good appearance, the average results being as in Table I.

Table I—Comparison of Gravity and Hand Separations

	Floated at 2.0 Sp.Gr.		—Hand Picked—	
Size	Per-centage Recovery	Per centage Ash	Per-centage Recovery	Per-centage Ash
Egg	90.9	10.0	89.2	9.9
Stove	90.2	9.8	89.4	9.3
Nut	86.4	10.1	85.8	9.8
Pea	87.0	10.4	86.5	10.3
	88.3	10.1	87.7	9.8

This sample from the eastern end of the Middle Field averaged over 75 per cent float at 1.75 sp.gr.; approximately 9 per cent sank in 1.75 and floated at 2.0 sp.gr. This test did not give convincing proof that all coal floating at 2.0 sp.gr. would pass as quality combustible, but I am optimistic enough to believe that maximum recovery can be obtained at from 1.9 to 2.0 sp.gr., provided the product between minus 1.75 and plus 2.0 is not in excess of, say, 6 to 9 per cent.

Samples from other fields gave similar results. In the Wyoming Valley Field 90.5 per cent by weight of the feed was floated at 2.0 sp.gr. with a 9.5 per cent ash. The total ash in the feed was 16.05 per cent. In the west end of the Middle Field 72.1 per cent floated at 1.75 sp.gr. with 11.5 per cent ash; 78.1 per cent floated at 1.9 sp.gr. with 13.7 per cent ash, and 80.7 per cent floated at 2.0 sp.gr. with 14.9 per cent ash. The total ash in the feed was 27.1 per cent. This sample should be cut at approximately 1.82 per cent, so that it will not have more than 12 per cent ash.

IN THE Southern Field 76.6 per cent floated at 1.75 sp.gr. with 11.8 per cent ash; 82.2 per cent at 1.9 sp.gr. with 13.5 per cent ash, and 86.5 per cent at 2.0 sp.gr. with 15.5 per cent ash. The total ash in the feed was 23.4 per cent.

It seems obvious that maximum recovery is dependent upon a close association between the mines and the preparation plant, so that the run-of-mine feed from different beds can be mixed in proper proportions to produce the best product of quality combustible. I have found that washability curves prepared from run-of mine samples are excellent guides from which to pro-rate the number of mine cars from each bed or from the various sections of the mines.

When quality combustible replaces quality coal, as it certainly should, then our visual inspection, on the loaded railroad car, should be replaced by inspection before loading. I believe an ash meter can be developed which will have a recording chart, so that the ash content of the product flowing to the storage pockets or railroad cars will be shown continuously.

THIS information for the breaker boss should be an invaluable help in operating his plant, for he will know at all times whether the finished coal meets the trade specifications. A similar machine on the refuse will give him a check on the recovery, so that he will constantly have all necessary information to operate at maximum efficiency.

The dry breaker with hand-picked and mechanically cleaned products is practically obsolete, due to the depletion of the clean thick beds. Hand cleaning is expensive, as much good coal is wasted. Dry cleaners are nearly extinct; they also are wasteful, due to breakage and poor recovery. About the only relic of the early dry breaker is the picking head, where the large sizes of the feed are hand-picked of rock and foreign material, preparatory to the final cleaning.

The industry is well supplied with classification machines to suit almost any problem, condition or pocketbook. They are not perfect, it is true, because they all are manually controlled, but the attendance has been reduced to a minimum, so that one man can operate a 3,000-ton-per-day machine. Though high recovery is important, and not to be neglected, it is not nearly as momentous, in my opinion, as the reduction of losses from crushing and screening.

More money can be lost by inefficient breaking of coal in present-day rolls than is wasted on the refuse dump of the average breaker. The coal going to waste has been stressed, and yet the industry has been more or less indifferent to the more important problems of the economic breaking of coal into sizes and its efficient screening.

I have no cure to offer, but, having given the subject serious thought, I have some plans which I hope soon will be in operation. To get some idea of the way in which this loss compares with the loss from failing to get maximum recovery, take 1,000

Abstract of article read before joint meeting of the Engineers' Society of Northeastern Pennsylvania and the Lehigh Section of The American Society of Mechanical Engineers, Scranton, Pa., Mar. 21.

tons of feed containing 14.5 per cent of refuse, or 855 tons of coal and 145 tons of waste-bank material. An average refuse sample would contain 3 to 5 per cent of coal. I will use 5 per cent, or an approximate total of 7.25 tons, of which 65 per cent is of prepared sizes and 35 per cent pea-and-smaller. The approximate value of the coal in the refuse therefore is $45.

IF THE 855 tons of coal were shipped in sizes from broken down, the return would approximate $6,200. If, due to lack of demand, the larger sizes were crushed to stove and smaller, the value of the resulting product would be $6,075, or a loss due degradation of $125, or nearly three times the saving due to 100-per cent recovery. The figures, I believe, fairly represent the loss, so you can realize the importance of trying to improve crushing and screening methods.

The present so-called standard toothed roll should give, in general, 85 to 90 per cent of prepared sizes, which seems about as much as can be expected. The slow speed—250 ft. per minute—cuts down the velocity of fall onto the chute below the roll to about that due to a 1-ft. fall. The total fall is approximately 2 ft. from roll to receiving chute plus 1 ft. velocity head, or 3 ft. in all. The breakage due to this head into pea-and-smaller is approximately 2½ per cent for egg, 2.8 per cent for stove and 5.2 per cent for nut. If this breakage alone could be eliminated there would be a handsome saving.

I have designed a breaker set consisting of a smooth and a toothed roll, geared in the ordinary way and set on an incline of 45 deg. The smooth roll is an anvil on which the coal is broken by the toothed roll. The product from the roll slides off the smooth roll onto a plate, eliminating practically all drop with its accompanying breakage. Shop tests gave up to 93 per cent prepared sizes when breaking through one size only.

I am thoroughly convinced that the most efficient results are obtained when each size is broken to the next smaller. I have made hundreds of roll tests and have come to believe that the ideal roll or 'breaker" will be one in which the pieces to be broken will be supported on their ends and broken in two by a cutter bar which will strike the supported piece of coal midway between the supports. Laboratory test made by hand indicates an efficiency approaching 100 per cent. I realize the difficulty of designing such a coal breaker, but believe the preliminary results warrant a study along these lines.

I have tested almost every type of machine used to break or crush material—gyratory and jaw crushers, single-roll toothed crushers, smooth rolls, ring crushers, pulverizers, stamp mills, steam hammers, and so on. But of all these, the present design seems to me the most practical to date. The roll diameter within limits seems to have little effect on the results but slow peripheral speed and sharp-pointed teeth have a marked influence on the yield of prepared sizes.

In order to produce quality sized coal it is of utmost importance to develop, if possible, a more efficient screen. The average efficiency in commercial practice is 60 per cent, and 75 per cent is extremely good, whereas 90 per cent is about as high as can be reached by hand screening. In spite of this fact we adopt a standard mesh, and then specify an impossible limit of undersizes; so that, in order to get results, we must use a larger mesh.

This is particularly true of nut coal. We agree to use, say ¾-in. mesh, and prepare a product containing only 5 per cent undersize or pea coal. It can't be done. In order to get results we must use, say, 1⅜ in. mesh, with the result that some of the high-priced nut coal goes into the undersize. The whole business should be run on a practical commercial basis to produce a practical combustible product. The undersize, within limits, will not have any injurious effects on the burning qualities of the mixture, for the product is 100 per cent combustible.

Extremely long shakers have been installed to remove the undersize, but if oversize mesh is not used the length has little or no real effect. Of course the trouble is with the "difficult grains," or those pieces which are nearly of the same diameter as the mesh and will not fall through the holes.

Snubbing Pan Used With Machine Loading At Franklin County Mine

(*Continued from page 210*)

"about 85 per cent of the blue band is removed from the coal before the pans are dumped."

"Even if we had no parting near the bottom to remove," Mr. Taylor declared, "I would still recommend the use of snubbing pans in preparing places for mechanical loaders, because a place can be loaded out in much less time if it is snubbed before shooting, and because with this method of preparing the face the percentage of screenings is decreased."

Time alone will tell whether the snubbing pan is destined to be in the end a part of the process of mechanical loading. Economic pressure is bringing about the installation of adequate cleaning plants on the surface, thus making it less necessary to clean the coal underground. In any event the officials of the Franklin County Coal Co. deserve credit for inventing this device which has aided in the cleaning of the coal preparatory to mechanical loading.

* * *

Jack Pipe, Wire Blocks and Three-Pan Attachment Bar Used in Pulling the Pans With a Locomotive

By ROOF CONTROL

Rooms Are Slabbed With Only Four Per Cent Coal Loss

By W. H. Weimer

Mining Engineer,
Union Pacific Coal Co.,
Superior, Wyo.

ROOF CONTROL, so-called, has long baffled the coal industry. Mining engineering literature is more deficient in definite scientific data in this respect than in almost any other. In itself the expression is misleading, for roof action cannot be controlled. All that can be done is to learn as far as possible the laws governing the action of the overburden when the mineral is removed and then to plan operations so that none of those laws is violated.

The roof, of course, consists of two parts: (1) the greater mass of cover, or "overburden," and (2) that part which draws or shears off the ribs and is supported by timbering, which might be termed the "ceiling." In the discussion of roof control the main interest is in the former. Once started into motion its actions seem beyond mathematical expression. There are shearing, some types of beam action, slab failures, arching of many kinds, the creation and filling of voids. With so complicated an action little can be done to control either the movement or the rapidity of its progress.

In horizontal stratified deposits the roof over the excavated area will assume the shape of an arch, the actual shape depending on the alternating hard and soft layers which the arch lays bare. Authorities on subsidence declare that this arching process goes on till an apex is reached at a height about two-thirds of the shorter width of the area excavated. As more of the coal is mined the excavated area becomes larger and the arch of broken ground extends higher. Finally a point is reached at which the surface is affected.

When advancing under a sudden increase of cover, such as occurs when there is a sheer cliff on the surface, it is common practice to add to the chain pillars, leaving the size of the barriers as before. As the strata above the arches will press on the barriers it is obvious that the increase should be made there. Furthermore, after second mining with its resulting arch the barriers will be the supports for the load, which will now be considerably increased. The supported overhang constitutes a cantilever beam with its fixed end at the barrier. When this overhang fails the failure probably will be along fractures as shown in Fig. 1, the lines of fracture diminishing as they recede from the overhang.

If the barrier pillars are not of sufficient size to extend to or beyond the point where there is no fracture, these lines of fracture will manifest themselves by draw cracks somewhere over the primary openings, a condition that will give trouble before the lower limits of the workings are reached.

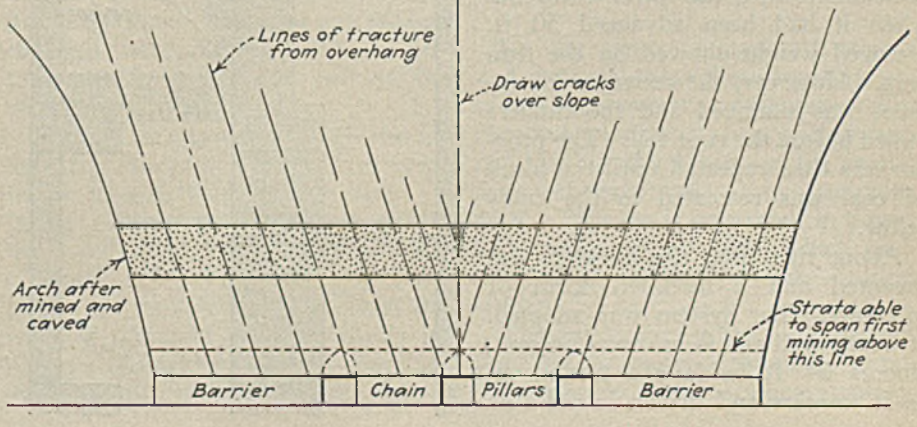
Some of the experiments at the Superior Mines throw some light on roof control problems and may be appropriately cited. In the early part of 1926 the Union Pacific Coal Co. installed two 25-hp. Eickhoff shaking conveyors at one of its Superior mines. Shortly after this installation the management decided to try a system of longface mining. A narrow place was driven from one entry to the next above, a distance of some 350 ft. A face about 250 ft. long was opened with 150 ft. of the face located on one side of the narrow place and 100 ft. on the other. The purpose was to retreat these faces to the entry below.

Bell cranks were used to drive the face conveyors, but this method proved impracticable and was soon discarded. A 25-hp. engine was introduced as an auxiliary drive. But, even with the impracticable bell cranks removed, many troubles remained. Several small roof breaks had been obtained with breakrows of timbers at a point 15 ft. from the working face.

It was soon evident that only what has been termed the ceiling was caving. Before the needed high cave was obtained the weight rode over the timbers and partly closed the working face. It was found possible to work in ahead of and around the fall and thus to re-establish conditions. But with the weight unrelieved it was impossible to extend the face and the system of working had to be radically changed.

So the 150-ft. face was allowed to stand and a new conveyorway was driven up on the opposite end of the 100-ft. face from the entry below. The expectation was that as no weight had exhibited its effects at this end of the face the weight of the shorter 100-ft. working would be thrown on

Fig. 1—Draw Cracks Destroy Roof Over Roadways



Abstract of article on "Roof Control," presented at the meeting of the Rocky Mountain Coal Mining Institute, Salt Lake City, Utah, March 13.

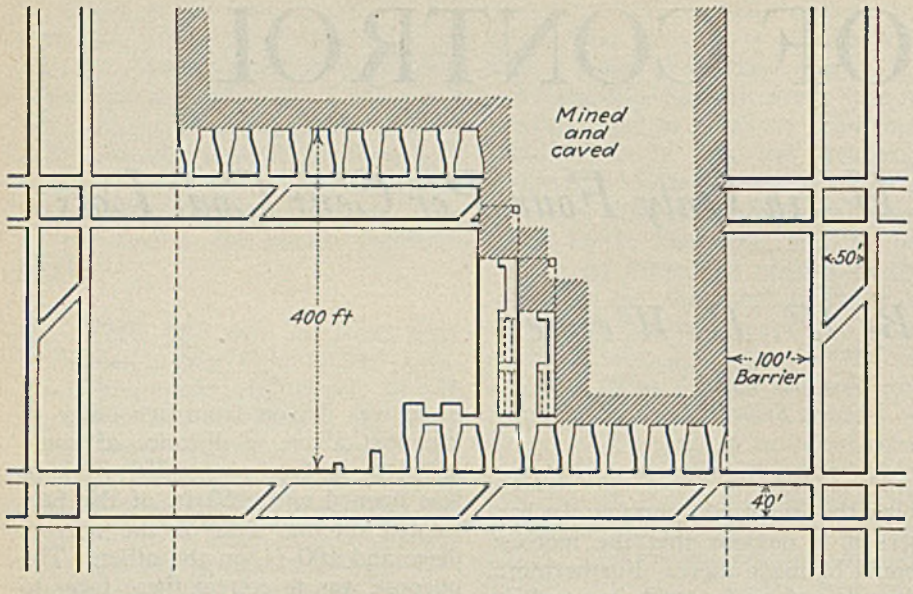


Fig. 2—Cleans Up Stumps and Chain Pillar of Heading Above

the solid pillar which was adjacent to the new conveyorway. Again the 100-ft. face was re-established and enough coal was removed to try to obtain another break. So the props were pulled to the breaking row. It was the same story, the timbers were not designed for such pressures, and the break came at the working face. It was decided that what had been attempted was to work longwall without the use of packs, which was impossible with a 3-ft. seam under 400 ft. of overburden and a roof that broke without yielding.

The longface plan was then abandoned and a system was evolved under which the face was re-established by driving a place of room width ahead of the old face, leaving a stump of coal about 6 or 8 ft. wide. Thus it was possible to get timber under the overhang of the caved roof. As the roof was little disturbed the room could be driven across the block of coal without difficulty. So once again a long face was ready for operation. This worked quite well, for the small stump of coal could be removed or broken up sufficiently that it would crush when the roof caved again.

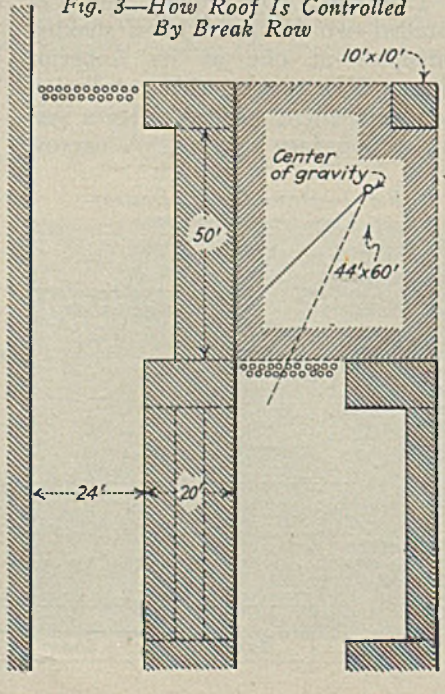
The long face was then extended downhill toward the lower entry but when it had been advanced 50 ft. renewed weight showed on the timbers. However, the conveyor equipment was removed and the timbers pulled before the roof fell. The process was then repeated until the block of coal was retreated to the entry below.

About this time the duckbill was invented and a modified form of room-and-pillar system was adopted. It works well and is in use at present. Rooms 24 ft. wide are turned on 44-ft. centers and driven in pairs as shown in Fig. 2. One complete conveyor unit is installed in each room. It is operated by a swing crew consisting of seven employees—two machine men, two timbermen, two facemen and one duckbill operative. The machine men and the timbermen prepare one room while the duckbill tender and his men load out the coal in the other.

In advancing the rooms a crossbar with three to five center posts is set after each cut. These are necessary to support the shale top immediately over the coal. This cap rock usually draws away from the upper strata soon after the face is shot and if not caught will often fall before the cut is loaded. To catch this rock, forepoles are set from the last crossbar.

In extreme cases the middle holes of the face must be shot first, leaving the coal on either side standing until the center of the cut is sufficiently cleaned out to get a post under the forward end of the forepoles. For this an adjustable steel post with a cap piece is used. After this has been set the side coal is shot and the rest of the coal loaded.

Fig. 3—How Roof Is Controlled By Break Row



As soon as the rooms, having crossed the entry above, hole into the goaf of the caved rooms on the upper side of that entry, the pillars are started on the retreat by a slabbing cut 50 ft. long. A 10-ft. stump is left at the upper end to support the loose end of the roof. With two more 50-ft. slabs the pillar is finished and the 10-ft. stump is reduced by mining till it is about 10 ft. square.

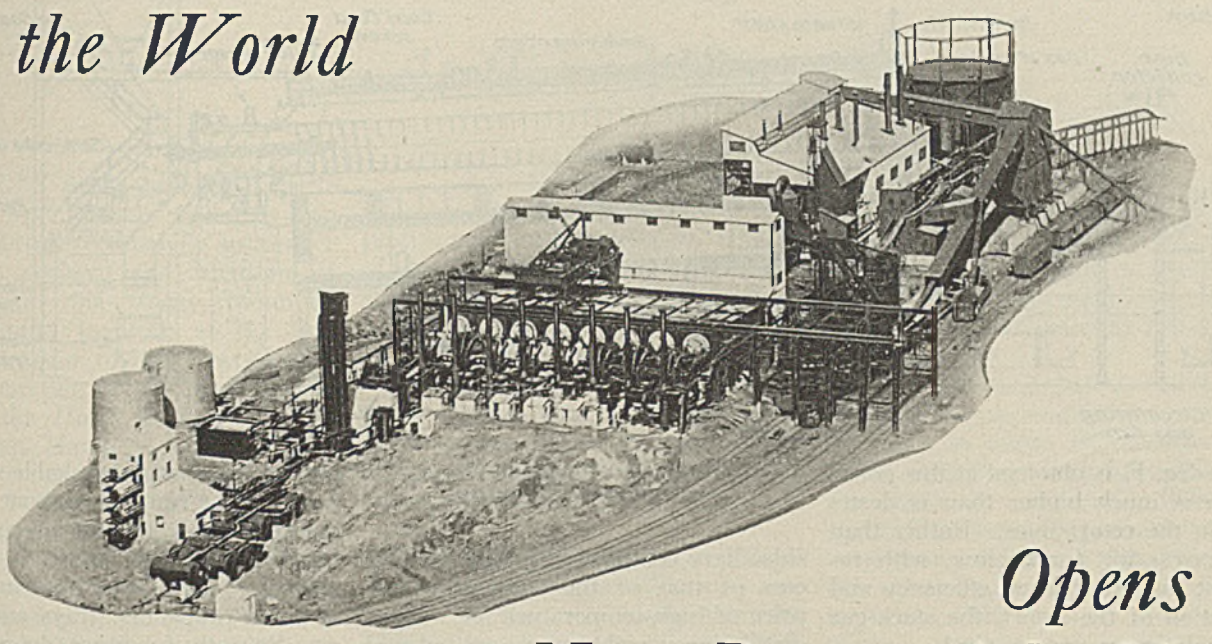
It has been found that this pillar will crush satisfactorily when the section caves. One room is kept in advance of the other so that when the pillars are being drawn the inside room will be 60 ft., or one pillar section, ahead of the other. This gives a good stepping effect, also the roof area to be supported in any one place is less than it would be if the pillars were being worked with their ends at an equal distance from the entry. The system has worked well because the entry with its room stumps can be recovered in the same operation as the room work.

In some fields this system could not be used because of gob fires. The rooms would have to be stopped before they reached the entry above, making it necessary to recover the entry and its room stumps as a second operation.

To analyze what happens when a section of roof caves Fig. 3 is presented. After the timbers have been removed the section is supported on only two sides, these being at an angle to each other. The small stump at the gobward corner, however, offers but little resistance to the descent of the roof. Thus there are a series of thin slabs supported on but two sides which when they fall must fail at these supports. Their center of gravity accordingly will be at the point shown in Fig 3.

The resultant of all horizontal forces tending to act in that direction will be along a line toward the weaker side and through the area from which the coal has been removed. This is represented on Fig. 3 by a broken line. By means of a breakrow of timbers this weak support is strengthened sufficiently to deflect this line of force into the solid coal. It is represented in Fig 3 by a solid line.

Largest Distilled-Coal Plant In the World



Opens at New Brunswick, N. J.

By R. Dawson Hall
Engineering Editor, Coal Age

THE largest low-temperature carbonization plant in the world, with an annual capacity of 250,000 tons of coal, equivalent to about 685 tons daily, has recently been erected at New Brunswick, N. J. The plant uses the K-S-G process, which takes its name from the Kohlenscheidungs-Gesellschaft (literally "Coal Separation Co."), a subsidiary of the International Combustion Engineering Co. The original plant, at Karnap, near Essen, Germany, has operated for the past five years. The installation is now being enlarged.

The New Brunswick plant was designed and built with American materials by the International Coal Carbonization Co. and will be operated by the New Jersey Coal & Tar Co., both of which are subsidiaries of the International Combustion Engineering Corporation. Each ton of coal yields 1,500 lb. of semi-coke, 25 gallons of tar, 3,500 cu.ft. of rich coal gas (about 900 B.t.u. per cubic foot) and 2 to 3 gallons of light oil. About 80 per cent of the semi-coke is recovered in salable sizes. The rest is consumed in making producer gas to underfire the retorts and in generating steam for the process and for power.

The retort in which the coal is carbonized consists of two concentric drums, externally heated, inclined slightly from the horizontal and rotated at three-quarters of a revolution per minute on the bullrings at each end. The outer drum is 72 ft. long with a 10-ft. diameter and the inner drum is 85 ft. long with a diameter of 5½ ft.

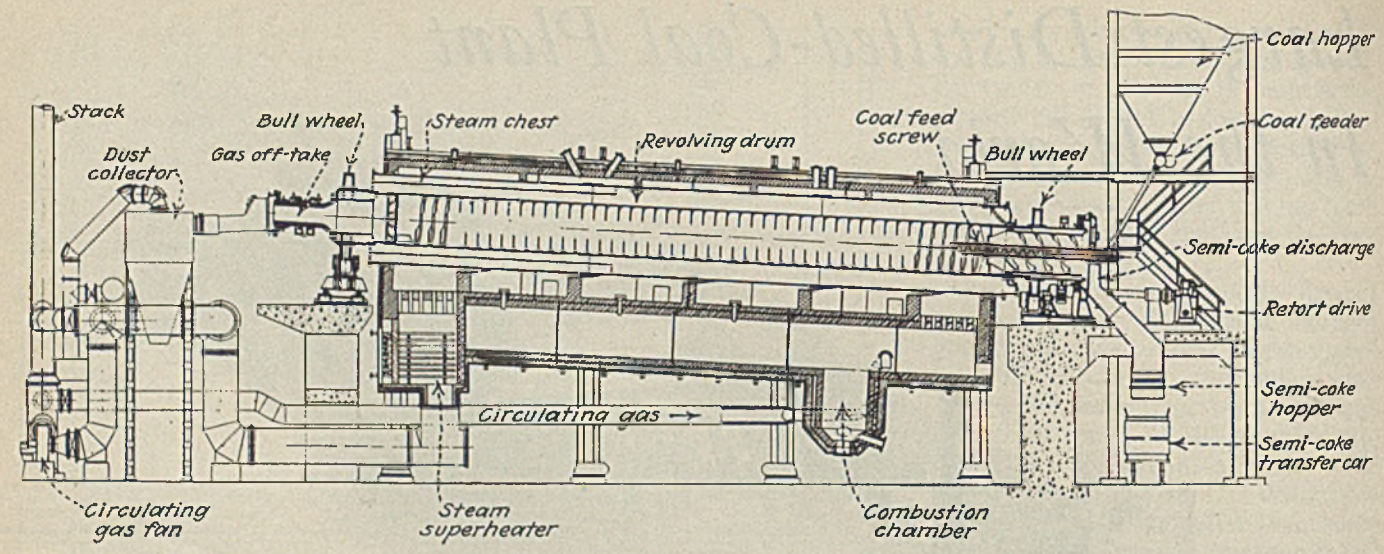
RAW coal is fed continuously from a storage bin into the retort through a screw conveyor. Then it is carried by helical flanges in the inner drum to the upper end, where it spills through open ports into the outer drum. This inner cylinder is kept at about 400 deg. F. Upon passing by gravity down the outer cylinder to its lower end, it is picked up as semi-coke by a series of scoops, dropped onto a receiving plate and carried by the reverse flanges to the discharge gate. The coal gas escapes through the drum head and the offtake pipe at the upper end of the retort.

During its passage through the inner drum the coal is heated to a point below its softening temperature. It is then plunged into the upper end of the outer retort, where a temperature of about 1,300 deg. F. is maintained partly by the heat derived from the burning producer gas and partly by its own exothermic action. Each individual coal particle is thus almost immediately "case-hardened," so to speak, with a layer of non-sticky semi-coke, so that its agglomerating properties are correspondingly reduced.

The case-hardening greatly reduces the deposit of carbon on the walls, but the introduction of steam through a series of steam chests assists in this result. There are eight of these chests extending along the inner wall of the outer drum for the upper third of its length, but by means of an automatic valve the steam is admitted only through those that are actually under the fuel bed. The direction of the steam is tangential, so that a screen of vapor is continuously interposed between the fuel and the retort walls. As a final precaution several chains are stretched longitudinally in the upper end of the outer retort so that any adhering carbon is scraped off.

AS the retort is made of steel a neutral atmosphere must be obtained to prevent oxidation. The cheapest possible gaseous fuel is used for heating the retort, which is hot producer gas made from semi-coke fines. This gas is generated in a central producer-gas plant, but each retort has an independent heating system.

The gas is burned in a combustion chamber in exact combining ratio. Consequently a temperature of about



Cross-Section Carbonizing Retort and Accessory Equipment

2,500 deg. F. is obtained at this point, which is much higher than is desirable in the retort flues. Rather than use excess air for cooling, with resultant loss of thermal efficiency and oxidation of the retort, the stack-gas recirculation system is used.

In this system a circulating fan takes some of the flue gases from the base of the stack, mixes them with some of the hot gases from the combustion chamber and forces them into the first pass at the lower end of the retort setting, where a temperature of 1,200 deg. F. is maintained. This mixed heating gas is baffled in such manner that it passes in a helical course around the retort.

The heat abstrated from it by the carbonizing coal is replaced by introducing hot combustion-chamber gas into each pass through ports connecting with a control flue running longitudinally under the retort. The dampers in these ports are so arranged that increasingly higher temperatures are maintained in each pass, reaching 1,350 deg. F. in the uppermost pass. The steam used in the retort has a temperature of 900 deg. F. It not only prevents the formation of carbon on the retort walls but also excessive cracking of the tar vapor.

The semi-coke is to be marketed under the registered name of "Disco," from "distilled coal." It burns with a short blue flame and is entirely smokeless. So far none of the semi-coke has been sold. A large pile has accumulated at the works. The product will be screened into the usual domestic sizes, $\frac{3}{4}$ in. being the smallest size offered for sale. The $\frac{1}{4}$x$\frac{3}{4}$-in. semi-coke will be used for producer fuel and the 0x$\frac{1}{4}$-in. for raising steam in boilers. At Essen 80 per cent of the run-of-retort is recovered in lumps larger than $\frac{3}{4}$ in.

The tar and light oil are sold to a subsidiary company at a figure in excess of that of the current market price of high-temperature tar. Upon distillation it yields a creosote oil said to be unusually toxic. Low-temperature tar also has a high content of phenols and cresols, the value of which the chemical industry has in the last few years begun to recognize. It is claimed that from a ton of coal under this process five times as much phenol is derived as from high-temperature carbonization.

The phenolic acid derived from a ton of coal by the K-S-G process weighs about 40 lb. It is combined with an equal quantity of formaldehyde. The two liquids form a powder. Mixed with an equal quantity of wood flour and some coloring matter to improve the appearance of the product and the mixture put into a mold under great heat and pressure, it is converted into a synthetic resin of bakelite type, known to the company as "Indur."

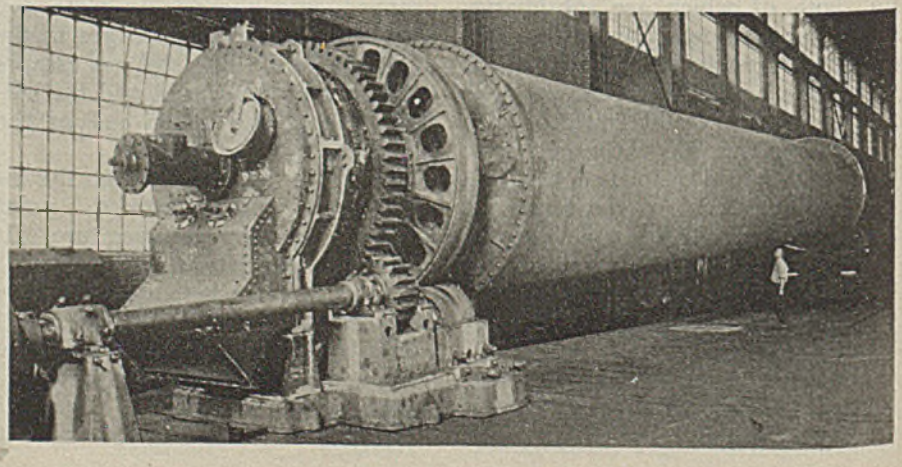
Thus 80 lb. of a substance incombustible, almost unbreakable and with a color that runs throughout its substance is made per ton of coal. For bakelite materials there is a large market. They have been made into airplane propellers, trays and crockery. Recently furniture, doors, wainscoting and interior trim have been made of them.

In addition to the light oil scrubbed from the gas about 5 gallons more can be distilled from the tar. It is said that it has a greater anti-knock value than coke-oven benzol.

The New Brunswick plant has eight retorts of which two are operating. Each has a rated capacity of 80 tons of coal daily. The cost of such a plant is said to be $10 per ton of coal treated annually. From that it will be seen what a gigantic proposition it would be to convert all the bituminous coal produced in the United States so as to get the heat equivalent of the present production. The cost would be about $7,250,000,000.

A seven-retort K-S-G plant is being constructed at Coatesville, Pa., to be operated by the Pennsylvania Coal & Tar Co. It will sell its retort gas without mixture with blue gas to the Lukens Steel Co.

Coal Is Carbonized in Eight Cylinders Like This



HOW TO PREVENT ACCIDENTS

At Coal Mines

SAFETY in its broadest aspects and specific steps taken by two important companies to reduce accidents engaged the attention of members of the Rocky Mountain Coal Mining Institute at the first technical session of the twenty-eighth regular meeting of the organization, held at the Hotel Utah, Salt Lake City, Utah, March 11. Daniel Harrington, chief engineer, safety division, U. S. Bureau of Mines, painted the broad picture of safety work for the delegates. How the Phelps Dodge Corporation has cut the accident rate at its Dawson mines from 1.656 to 0.313 per 1,000 shifts since 1924 was told by William Moorhead, safety engineer for the corporation. J. P. Russell, general safety inspector, United States Fuel Co., described the methods used by his company to make mining less hazardous.

Education, said Mr. Harrington, is a necessity if our mines are to be reasonably safe, and the best and least expensive method seems to be intensive supervision and discipline—starting with the head of the organization and extending completely through it. Definite progress in many states in 1928 in reducing accidents from falls of roof, explosives and other causes gives reason to believe that at last the accident record in the United States will show a definite improvement.

For the past decade, he continued, almost half the mine fatalities have resulted from falls of roof. This type of accident can be prevented, however, if a really determined and continued effort be made. An all-year campaign in Alabama in 1928 reduced such accidents materially and similar results were attained in western Pennsylvania in an intensive no-accident drive in November, 1928. "In many instances the effort of the individual mining company has resulted in a practical elimination of accidents from falls of roof and, in general, the secret of success in this work is intensive supervision.

"Next to falls of roof and coal, haulage is the most prolific source of accidents." Many of these unquestionably are a result of administrative deficiencies, such as lack of clearance, ill-constructed track or equipment in bad condition. "Though haulage accidents will continue to occur in spite of precautionary measures, at least 75, and possibly 90, per cent may be ascribed to the neglect of the operator."

EXPLOSIONS of gas and coal dust cost about 300 lives annually; in the year ended June 30, 1928, at least 340 persons were killed in 30 explosions. Electric ignitions were responsible for nearly 83 per cent of these fatalities. Fourteen ignitions were caused by non-permissible equipment, faulty wiring or careless use of electrical connections. "In every instance the ultimate fault rests upon the management which provided unsafe electrical equipment or permitted unsafe electrical practices. In not a single case where ignition took place was the electrical equipment of the permissible type.

"Open lights and smoking were responsible for eleven explosions with a total loss of 47 lives; here again the responsibility must rest upon the management, whether the ignition was caused by an open light or by smoking in a closed-light mine. During the past year there were the usual number of explosions of methane in mines rated non-gassy; for the most part the methane was ignited by open lights." Smoking has become a serious hazard, resulting in explosions every year. "The sad part is that it is frequently winked at by the operating officials."

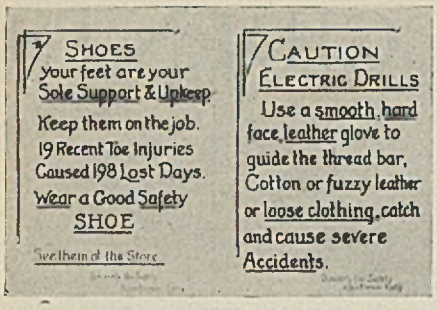
"In addition to having caused the ignitions which resulted in explosons last year, by which 282 persons were killed, electricity was responsibile for 88 deaths by contact." Within a short time electricity probably will be responsible for more fatalities than any other factor except falls of roof or coal. The trolley wire causes dozens of fires and explosions annually and every year a score or more persons are killed by coming in contact with it. And our coal-mining men, asserted the speaker, are particularly callous to the hazards growing out of its extended use. Trolley locomotives are another source of danger and their use should be carefully regulated by the operators. Low trolley wires are another source of accidents.

Electrical machinery which, within limitations, is comparatively safe, has been adopted very slowly. "The underlying causes for failure to use permissible machinery are that this comparatively safe equipment costs about 25 per cent more than the other much less safe open equipment and that repairs must be made promptly and efficiently or it will lose its permissibility," said Mr. Harrington.

The industry seems to be headed the right way unless it assumes that mechanization will automatically make for safety. Mechanized mining can be made safer, but unless more drastic precautions are adopted in concentrated mining the mine-accident rate, and particularly the disaster rate, will increase.

"It may not be amiss," remarked Mr. Harrington, "to call attention to the fact that there is a decided trend toward increasingly drastic compensation laws; in one Western state a fatal accident or a permanent total disability may result in com-

Car With Inner Insulated Box for Explosives



Bulletins Exhibited Around Plant

pensation payments of more than $50,000. It might be of definite benefit to the coal industry if compensation laws should be made as drastic as the one just mentioned, provided they were adopted in all states. Such a law would automatically eliminate the 'snowball' mines or those operating 'on a shoe string'—mines which invariably have unsafe conditions."

During 1924 the men of the Dawson mines and surface plants of the Phelps Dodge Corporation sustained 443 lost-time accidents, said Mr. Moorhead. In that same year, with the co-operation of the State Supervisor of Trade and Industrial Education, it was decided to extend the course to cover practical ways of performing work and to emphasize safety.

Recognizing that experienced miners would continue to be difficult to obtain, an underground school was started to train new employees. This school has been superseded by underground schools of instruction at each mine under the supervision of the mine foreman. Each pupil must complete a prescribed course and show proficiency before taking a regular job.

THE rule book of the company has been rewritten in catechism form in three languages and the questions and answers are used by the instructors in classes to teach these rules. All the supervisory force were first required to pass the examination, after which the other men were asked to. Up to the present time all the men who have been with the company 30 days have been examined individually and have answered 90 per cent correctly the general rules and those that apply directly to their jobs.

It is conceded that 90 per cent of the scalp injuries formerly incurred could have been prevented and consequently every man in the Dawson mines must wear a "hard-boiled" hat while underground. In addition, all men engaged in work where they are likely to get anything in their eyes are required to wear goggles. Shoes with hard toes, long-sleeved shirts and the general use of gloves are encouraged. The results of the compulsory use of hard-boiled hats and goggles at these mines are shown in Tables I and II.

Table I—Scalp Injuries at Dawson Mines by Years

	1924	1925	1926	1927	1928
Number of injuries.	62	37	35	14	4
Days lost.....	6,532	412	199	73	27

Table II—Eye Injuries at Dawson Mines by Years

	1924	1925	1926	1927	1928
Number of injuries.	103	68	32	4	0
Days lost.....	728	1,034	113	3	0

Phelps Dodge safety committees are of two kinds; the department committee consists of workmen with the foreman or assistant acting as chairman. Meetings are held once a month for inspections, reviewing accidents and making recommendations to the general committee. The latter is composed of the local executive staff and holds monthly meetings to pass on recommendations of the departmental committee and to review accidents.

Some time ago the company began to discipline offenders against the rules and penalties have been imposed in 217 cases, 17 being dismissals from service. The violations for which disciplinary action was taken are summarized in Table III. Three foremen have been disciplined for neglect of supervisory duties. During the past three years all injured men were required to report to the Safety Department before returning to work.

Table III—Principal Infractions Disciplined

(Dawson Mines—Phelps Dodge Corporation)

Rule	Number of Violations
Not wearing goggles.....	87
Not checking out at quitting time.....	31
Timbering.....	34
Working under loose top.....	16
Loading coal when dry.....	12
Disobedience to orders.....	4
Possession of matches.....	3
Miscellaneous.....	32

THE accident rate for 1928 is only 19 per cent of the 1924 rate and should be further reduced, in the opinion of Mr. Moorhead. In the last half of 1928 only 14 accidents occurred as against 64 in the first six months. Over 4,000 tons of rock dust and 20,000 tons of adobe have been used and 57 miles of new pipe and 12 miles of rubber hose have been installed. Up to March 4, 1929, No. 1 mine had worked 257 days without an accident; No. 4, 270 days; No. 5, 245 days, and No. 9, 181. The reduction in accident rates at the Dawson mines and surface plants is set forth in Table IV.

Table IV—Accidents in Last Five Years

(Dawson Mines—Phelps Dodge Corporation)

Year	Number of Accidents	Rate per 1,000 Shifts
1924.....	443	1.656
925.....	382	1.490
1926.....	297	0.820
1927.....	167	0.550
1928.....	78	0.313

Although the mines of the United States Fuel Co., in Utah, are free from explosive gas, Mr. Russell stated that the coal dust is extremely inflammable and the general safety provisions have been made almost as drastic as if the mines were gassy. All main haulageways and producing levels are kept well rock-dusted and samples are collected each month for analysis, the results being furnished

Daniel Harrington

to the superintendents. Haulageways are cleaned before redusting and refuse and cleanings are hauled out of the mines. The dust is kept about 75 per cent incombustible, the moisture not being considered except where the ribs, roof and floor are constantly wet.

Steel doors, large enough to pass a man, have been set in overcasts and every third stopping, a new high-pressure machine with a 300-ft. range installed and back entries and aircourses without track have been thoroughly rock-dusted. Dust also will be carried into rooms and close up to the face.

Rock-dust barriers have been installed to isolate the various sections of the mines. Two distinct types are used, one consisting of troughs of galvanized iron resting on iron supports. The others are of the trap-

door type with operating trip baffles located some distance inby and outby the barrier. Moisture-proof all-metal cans, holding about one pint, are used in collecting the samples. The incombustible content is determined by a volumetric-analysis apparatus, the graphic chart being enlarged to 10x10 to facilitate reading.

Sprinkling is mandatory where rock-dusting is not done. Water under pressure is piped to each working place and a hose furnished for it to the face. Miners must sprinkle their places at the beginning of each shift, before shooting, after each fall of coal, several times while loading and must wet the places thoroughly before quitting. The intake air is moistened by sprays and others underground douse the cars as they pass. Water sprays also are installed on the cutter bars of each machine and dry cutting is prohibited. All entries are piped for water, as much dust can be raised in rooms, even with water dripping freely from the roof.

ALL machines using trailing cables are equipped with plug connectors with a special tension clamp. Effort is being made to keep one or two spares on hand so that damaged cables can be sent to the outside where proper splices and repairs can be more easily made. Small portable electric face pumps are each equipped with a length of rubber-covered cable with proper plug connectors so that connections can be kept a proper distance from the face and temporary, poorly-hung extensions need not be made. A plug connector should be used for all power lines, rather than the usual bent wire or hook, as it seldom makes a good connection.

Portable electric-drill operators should wear smooth leather gloves and well-fitting clothes, said Mr. Russell. Machinery should not be left unattended on a haulageway or entry or, if this is necessary, it should be guarded by a red light.

Underground oiling stations should be located in crosscuts away from the ventilating current. Neatness is essential and sand should be employed to absorb oil spillage and to extinguish fires—in connection with a chemical fire extinguisher. All cleanings should be placed in tight metal cans and loaded out every day.

Contract miners carry their own powder in fiber cases and wooden boxes are provided in the working places for its storage. Caps are issued by a shot inspector who visits each place during a working shift. Any unused powder or caps are returned to the surface.

ALL shots are fired electrically from the surface after the miners have left the mines. Shooting circuits are separate from the power lines and are protected by numerous branch switches and gaps. All main and section switches are in special locked boxes, arranged so that the switch handle will project from the box when the switch is open, thus clearly indicating that fact. These locked switches can be opened only by the shotfirers. Main shooting circuits are carried in back entries entirely away from the power lines.

Whenever a shooting circuit crosses a power line, continued Mr. Russell, extra supports are provided and extra insulation used. A switch also is located on the inby side in full view of the crossing. Each room or working place has a small unboxed knife switch for further safety. The miner is instructed always to open this switch on entering the place and to close it when leaving if he has loaded or wired any shots for blasting. In the mechanical-loading sections the coal is shot by company men and the powder is taken into the mine in a specially built, insulated powder car. All holes for shooting are inspected by shotfirers and each face is inspected immediately after shooting.

All working places are inspected just before the men start in and each is visited several times during the day and unsafe conditions noted or remedied. If conditions warrant, the men are kept out or are accompanied to the places by someone in authority, who remains until the place is made safe.

Underground machinery is daily inspected by a member of the mechanical department. Mine cars are examined daily for damaged couplings, safety chains, wracked bodies, damaged wheels and axles. Defective equipment is quickly repaired or the car is sent to the shop. Couplings and pins are regularly annealed and are examined for flaws while under heat. Practically all link failures have occurred in places that have been welded and the failure generally is due to spreading at the weld scarf. Tramways are kept clean, the equipment well oiled and serviced, and the ropes inspected for broken strands.

Hospital and First-Aid Room

THE checking system for miners is more thorough than that usually employed and a man can be quickly located, whether at home or underground. Bulletins, both of the National Safety Council and home-made, are displayed at all conspicuous points both above and below ground. Well-protected first-aid material is kept handy to all working places on the surface and in the mines. Locomotives, which are often in the vicinity of accidents, will be equipped with a special first-aid kit.

A central mine-rescue station is maintained at Hiawatha, Utah, and the distant mines also are equipped with breathing apparatus and supplies. The breathing apparatus is removed from the trunks and stored in a specially built moist room. All spare rubber parts are kept there also, to prevent deterioration. Boxes containing extra parts and tools and portable telephone sets are kept ready for emergency calls.

Training and instruction is in charge of the safety engineer, who keeps a record of all accidents and issues a monthly chart showing the record of each mine. Safety shoes, hard-boiled hats and goggles have been introduced and the men are urged to wear them. Head, toe and eye injuries are shown in Table V.

Table V—Eye and Scalp Injuries

(United States Fuel Co. Mines)

Mine	Head	Lost Time, Hrs.	Toes	Lost Time, Hrs.	Eyes	Lost Time, Hrs.
King No. 1 Mine	12	175	6	87	3	22
King No. 2 Mine	7	109	12	106	2	8
Panther Mine...	0	0	1	5	3	16
Totals.....	19	284	19	198	8	46

Better Than Appeared

In the second paragraph of the article entitled "Alabama Presents Solid Front in Safety Campaign," which appeared on page 168 of the March issue of COAL AGE, *it was stated that "in 1928 the fatality rate was 1 to 216,194 in the mining of 17,500,000 tons." The second figure, however, was incorrect; it should have been 261,194.*

COAL AGE

Published by McGraw-Hill Publishing Company, Inc.

SYDNEY A. HALE, *Managing Editor*

NEW YORK, APRIL, 1929

Executives in mining

SOME YEARS BACK when an appointment had been made to an important position in Washington someone remarked that the man appointed probably would succeed because he was not sufficiently competent in the class of work he was to supervise to be led away from the main issues by a too meticulous interest in the details of the job. Engineers in executive positions frequently fail to visualize the commercial problem. They are interested in good engineering rather than in the success of their organization. Too often with them engineering is an end, not a means.

They must realize also that they have not been selected to occupy the position because in that way may be combined executive capacity and engineering service. They must sweep to one side trammeling duties that interfere with success as a whole. The big problem must be given the time needed for its solution. It must ever be remembered, however, that the major interest of one day may not at all be that of the next. The executive must never be so busy that when the time comes for considering a major problem he will be so deeply involved in one or more small ones that he cannot leave them for the larger and more important interest.

Watch the cross timbers!

A LONG bill of indictment might be written against timber sets in mines if such a diatribe would serve any good purpose. Unfortunately such sets often are necessary evils. Every now and then they pick off a man on a passing trip who is holding his head too high. Now and again they are torn down by derailed cars, letting down tons of rock with fatal results to any who may be under the fall. Many a man also has been pinned between a timber leg and a passing car and never was able to work again. When there is an explosion the resistance to its progress while the timbers are standing or when they are piled in heaps is the cause of foci of detonation and violence far more severe than in an unobstructed heading.

In a paper read at the Rocky Mountain Coal Mining Institute, which appears in this issue, F. C. Miller most appropriately brings up for discussion the dangers of the fine coal dust that settles on mine timbers. This dust, he declared is of such potentiality that 85 per cent of inert dust is necessary to keep it immune from explosion. All of it, he finds, will go through a 70-mesh and practically all through a 200-mesh screen. Unfortunately it is placed just where it can do most damage, for gravity helps in its distribution. The crossbar and timber set are just the reverse of a rock-dust barrier; they are coal-dust spreaders, and most mines have more of these fire spreaders than they have of barriers.

In one group of Western mines these coal-dust deposits used to be removed at nights from the timbers by brooms plied by industrious Chinese workmen. This was not too safe a practice and it did not remove the dust from the mine, for the combustible particles merely found a place of lodgment elsewhere. Today rock-dusting is the preferred method. Perhaps vacuum cleaning would be better if it were not too expensive and if it did not, furthermore, introduce a hazard of its own. The material thus collected would have to be handled with caution.

If vacuum cleaning is not to be adopted it surely would be well to rock-dust the timbers somewhat more frequently than the mine floor. Mr. Miller's suggestion that a separate record be kept of the condition of timbers, ribs and floor is one to be heeded. In mines where the timber gathers excessive quantities of dust, concrete sprayed on the roof may be the solution, as it will make cross timbers unnecessary where the roof is not subjected to unusual weight. In the return roadways it might be well to dust timbers with the hand seeders which farmers use for spreading grain. They are equipped with a crank-operated disk. Or the dust could be laid on the timbers by hand, converting them into veritable rock-dust barriers. Some precautions should be taken; what they should be is left for the further consideration of our readers. Certain it is that the dangers of the dust reposing on mine timbers should not be suffered to go uncorrected.

The new spring drive

LARGER spring reductions, inauguration of a discount system for prompt payment of bills and the establishment by one large producer of a plan whereby the retailers can offer the householder deferred payments on his winter's supply of fuel usher in the new coal year in the anthracite industry. Of these attempts to woo the spirit of early buying the greatest interest undoubtedly centers upon the innovation embraced in the deferred-payment scheme, under which, it is understood, the householder may make a small down payment and extend the payment of the balance over several equal monthly instalments. The academic debate over the wisdom of the application of the principles of instalment buying to coal has been long; the actual inauguration of such a plan will give some evidence at least as to its efficiency.

Whatever the concrete results the steps taken the last few weeks are a frank recognition of a brutal situation. The consumer is not interested in the problems or the plight of the coal industry. He is living in an age of hand-to-mouth buying and sees no reason why his coal purchases should be exempted from the general rule of the age. If production peaks are to be flattened out, one or two things must be done: Either the mines and the retail distributors must carry the load of spring and summer storage, or early buying must be made so attractive to the consumer that he cannot resist the temptation to fill up his bins in April or May. How enticing the new inducements to the consumer are the records of the next few months will tell.

Strength of coal variable

JUST what resistance coal will offer to compression depends largely on the opportunity it has to escape the load put upon it. If it can avoid the stress by failure it does so; if not, it "grins and bears it."

In some cases the coal in Belgium is being mined at depths of as much as 4,000 ft. and therefore when opened up, must be sustaining a load of 4,400 lb. per square inch. Yet only occasionally is it found to be crushed and even then perhaps the crushing is due to conditions introduced by mining and is not a condition existent in a virgin bed. If it is not due to mining, the reason why only a part of the coal has been crushed is not quite clear. Perhaps, however, in the folding of the measures, pressure was increased and some stress may yet linger in the flexed rocks.

But it may not be necessary to assume that there is a difference of stress because there is a difference in the effects that such stress has produced, even with coal of equal intrinsic strength, for if the coal in one part should have crevices from folding, then the rock by crushing could partly relieve that stress by giving way laterally, which is just what it would do. Moreover, coal that cannot give way and thus escape stress becomes indurated and by reason of that fact more capable of resisting stress. Some coal in Belgium has been rendered so dense that it retains gas at pressures of as much as 625 lb. per square inch. This induration may have made the coal of Belgium more resistant than some others to pressure and may have rendered some of the coal more resistant than other coal in the same mine; hence the strength in some places and the weakness in others.

Coal when burrowed by headings is not as resistant as before, for after it is thus opened out it can shear on an angle to the vertical pressure and if there is no sidewise resistance it will do so. In Belgium and at Springhill, N. S., it has "walked out" into the mined area during bumps, sometimes for a distance of feet. As M. Cornet has said, the miners in Belgium say the coal "marches." A few seconds after the march begins the coal in Belgium pulverizes, is blown from the face and the mine fills with methane and dust.

In the tests made by the Scranton Engineers' Club at Lehigh University it was found that the strength of anthracite varied roughly with the square root of the ratio between the horizontal dimension of a square block and its depth. With blocks measuring 2x2 in. and 1 in. deep the strength of coal from different seams in various localities ran from 3,025 to 10,525 lb. per square inch, the larger figure being for coal from Hazleton.

If a pillar were 250 ft. wide and the coal were 5 ft. thick, the strength, according to the rule, would be five times as great, or 15,125 to 52,625 lb. per square inch—that is, if the rule still held true for such large pillars. It cannot, of course, be true indefinitely, for with an immeasurably large pillar the rule would make the strength per square inch infinite.

In estimating the strength of pillars it is well to remember that several small pillars will be much weaker than a single pillar having the same quantity and kind of coal. Moreover, crushed coal, like crushed sand, will support the roof provided the size of the pillar is large enough.

All this is not a plea for excessive first mining—quite the contrary; we are usually none too prudent at present—but it does explain why coal sometimes does not succumb to pressure when tremendous stresses are brought on the big, almost unbroken, pillars adjacent to large excavated areas such as are found at Springhill and in the Belgian longwall workings.

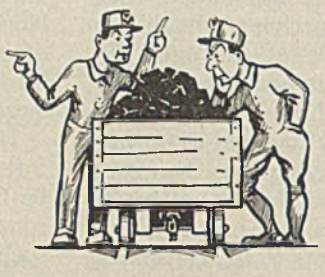
How safe?

MICHELANGELO is credited with the bon mot that "trifles make perfection and perfection is no trifle." Something of the philosophy of that observation must be ingrained in mine management and men if the bad-accident record of the coal mines is to be permanently lowered and the expectation that the industry is upon the threshold of that reduction is to be realized. That such a change is not impossible is proved by the growing list of mines which are producing coal without funerals.

In addition to the banner record of the Robinson mine, now in its fourteenth no-fatality year, a recent survey showed four mines operating three to eight years without a fatality and a group of nine mines running fourteen months without a death. The four mines in question have produced 6,926,020 tons and worked 9,624,291 man-hours.

Such records should be an inspiration to men and management all over the country. If it can be done in Colorado, in Illinois, in Pennsylvania and in Utah, it ought also to be possible in the other twenty-odd coal-producing states. But such records cannot be achieved by flash campaigns which soon flare out in the exhaustion of their own whoopee. The will to do must penetrate from top to bottom, from president to trapper boy, with a penetration that burns every day and every hour. In no other way can the ruthlessness of nature and the carelessness of man be curbed.

The BOSSES *Talk It Over*



Can Mining Machines Influence Output?

"YOU needn't come up here looking for good news because we haven't any," were the words that greeted Jim when he pulled up at the shanty. The morning was well along but a glance at the cars loaded showed the tonnage running sadly behind. Another look uncovered another disquieting fact.

"No wonder you're running behind if that's all the loaders you have," Jim retorted. "I don't see why we have these off days so frequently any more. It seems to me they didn't use to happen so monotonously."

"It's the same old story," Mac replied; "our cutting wasn't up and a lot of men didn't have places this morning."

"Well, you'll have to do something," said Jim. "What are the excuses this time?"

"Two of the crews say they have too much work to do and can't get around to all their places," Mac replied. "One or two others didn't get a report on some of the places and passed them up. And some were left down on account of a poor cleanup. All in all, we have fifteen men out on account of not having places this morning."

"That means about 250 tons at the rate we work around here," said Jim. "Good-bye costs."

"I'm trying to help the cost for the day by cutting off part of our track and timber helpers and by sending the extra gang home," said Mac, "but it will still be pretty high what with the motormen, brakemen, switchmen and trappers we have to keep."

"That's a poor way of doing business even at that," said Jim. "We're going to have to reorganize our system of cutting some way, if we're going to prevent these off days."

WHAT DO YOU THINK?

1. *How do you apportion your cutting to give each machine crew a fair day's work and make sure that all places are cut?*

2. *Does cutting at day or at night insure all places being reached?*

3. *How do you report places to be cut to the machine crew?*

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

Thrift vs. Safety in Timbering

Moral Obligation Is Greater Than Economic Responsibility

MAC is right in his refusal to risk human life for the saving of a few mine props. Would that we had a few more foremen of his type, who are conscious of their responsibility for the safety of the fellows under them. A good foreman each night will ask himself, "Have I done all that is humanly possible to protect the men in my charge?"

Mac may have misunderstood the Old Man on the timbering question. It may be that Mac's timbering cost per ton actually is too high; it may need shaving or explaining. It is an easy matter to get too many timbers into a place or to leave some of them in abandoned workings to rot. All mine managers today know that accidents result in losses that do not stop when compensation is paid.

If a miner is lax or inclined to take risks in timbering, the face foreman should at first reason with him. If then the miner fails to take heed he should be dismissed. The system of timbering used must depend entirely on conditions, and the best plan is evolved only by trial and experience. Yes, timbering should be left to the foreman—provided he is competent. Unfortunately, most mine foremen come from the ranks as haulage and company men. Consequently they do not have that intimate knowledge of roof control which is possessed by a man who was once a miner. To use slang, "a miner knows his onions," and consequently will resent ill-advised instructions from a foreman who knows not whereof he speaks.

As to Mac quitting his job, I think he ought first to find out exactly what the Old Man means. With coal selling at the bottom, it is necessary for management to closely scan and criticize every item; but if, even with that, Mac feels a risk is being taken, then he should quit. It might seem right to take the easy way and reason that maybe the risk can be taken without the occurrence of accidents. But accidents always accompany risks. Perhaps Mac has labored many years to achieve promotion and it may be that he has a large family dependent upon his ability to work day after day. So has the miner. Mac should, as he suggests, cut the corners in some other way and not neglect timbering. JOHN W. JONES.
Altoona, Ala.

When is Good Roof Bad?

HOSPITALS are kept busy attending to miners who believe in setting timber when they think the roof is *bad* and allowing their timbering to get behind when they think the roof is *good.*

The average miner cannot be depended upon to take care of himself or do his best from a safety standpoint. It is necessary, therefore, to require a uniform system of timbering, sponsored by the company and enforced by the foreman and his assistants. Then a definite number of posts are invariably set—never any less, but sometimes more if the foreman or workman feels they are needed.

A good code of rules for timbering at the working face follows: (1) All good roof must be timbered; (2) all bad roof must be taken down where feasible; (3) the distance between posts should not exceed 5 ft.; they should be set plumb and covered with a good cap; (4) timbers should be set within 2 ft. of the working face before shooting; (5) have available at all times a supply of timber and the necessary tools to do safe work. GEORGE EDWARDS.
Paintsville, Ky.

Mr. Higher-Up, Take Notice

When working places are not cut regularly, the trouble lies farther afield than in the mere operation of the cutting machines. Indeed it is a reflection on the mangement set-up and indicates that at one or more points along the line mine operation is being loosely conducted. Cutters are the vanguard and if they falter in their stride the whole mining brigade falls back.

This question of cutting coal is vital to the very foundation of sound management. Its discussion, in the May issue, should receive the earnest consideration of every management official in every coal-mining company. Mr. General Manager, let's have your views, too.

Good Timbering Saves Money In Addition to Miners Lives

SOME mine managements forget that timbers frequently are set for purposes aside from the protection of men from falls of roof. They forget that timbers also are set as a means of avoiding the labor and cost of cleaning up falls. Will it be more economical to hold the roof by timbers or is it better to take it down? Will the roof or sides actually be safer if certain portions of the material are taken down? What will be the effect on mining costs if timbering of a haulway is neglected and a big fall ties up haulage? What happens when timbering in aircourses is neglected and falls occur which partly or almost entirely choke ventilation? These points must not be overlooked.

Timbering should be left to the judgment of the mine foreman. He should be equipped to decide the question of timbering on an economic basis. If he is not so fitted, he lacks the training, experience and intelligence that are required in a good foreman. The engineering department comes into the picture when special permanent timbering jobs arise. It should furnish the foreman with information as to the kind and size of permanent timbers and how they should be erected.

Mac would do wrong to quit his job. He should state his case in writing by a letter to the "super," giving all relevant information as to method and cost of his method. The letter should explain conditions and why his system is necessary. Then if Jim refuses to recognize his claim, Jim alone should be held responsible for roof accidents.
Muse, Pa. THOMAS BRENNAN.

If Props Are Used But Once Timbering Cost Will Be High

FALLING roof never waits for the miner to load his car before setting a prop to make his place safe. Every time a working place is cut, fresh roof is uncovered, the nature of which is not known until it has been exposed. A chance is taken if no timbers are placed, regardless of the nature of the roof. There should be no line drawn between the placing and omitting of timber, as all roofs in working places require more or less support. To secure a working coal face we are compelled to be guided by circumstances.

It has been my experience that most accidents from falls of roof at the face have occurred where the roof was to all appearances good. Where the roof is obviously unreliable, a miner needs no compulsion to set sufficient timber, but where the roof seems good, especially if it be rock, he will not of his own accord set timbers in sufficient number to guard against the unknown danger which may be lurking in the roof. The only drawback to systematic timbering, as I see it, is that when a maximum distance has been fixed the miner may be apt to treat it as the minimum as well, and this, to a great extent, probably would defeat the object of the rule.

Some persons are inclined to attribute falls of roof in some instances to sys-

tematic timbering, as when a fall occurs between props. The cause is not systematic timbering, but non-observance of the roof or laxity on the part of the miners. Much depends upon the individual. Cap boards 18 in. to 24 in. long should be provided and no timber should be set without a cap. These should be placed on the timbers at right angles to the cleavage lines of the roof in order to support loose rock bounded by slips or cracks.

It isn't the cost of the timbers or the charge for hauling them into the mine and setting them that runs the cost up. It is the complete loss of the value of a sound timber after it has served its purpose that makes timbering costly. Besides having systematic setting we should also have systematic recovery of timbers. W. W. HUNTER.

Mt. Hope, W. Va.

Use of Steel Roof Supports Urged on Main Haulage Roads

WHERE the air return is through the main haulage entry, timbers decay rapidly and must be frequently replaced. Furthermore, if the timber sets are located between the track and the rib line of the entry, a derailed trip is likely to dislodge these timbers, bring down roof and delay operations. These timbers also choke the free passage of air around the sides of a passing trip. For these reasons it is best to use steel crossbars on haulage roads, setting them in deep hitches in the ribs.

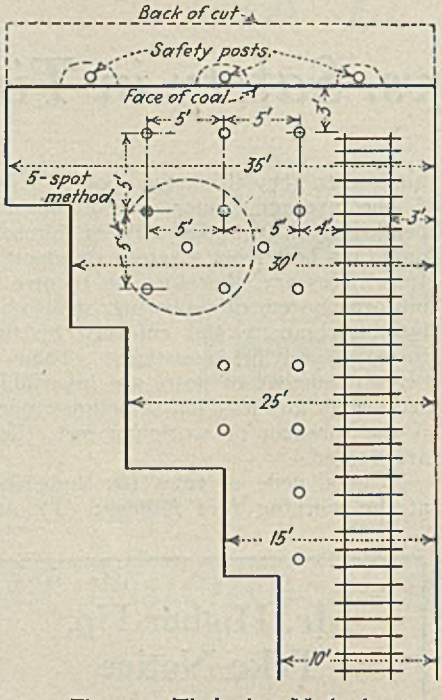
I believe timbering should be left to the judgment of the foreman, for he is in daily contact with roof conditions and understands how the roof acts better than one who visits the mine only occasionally. The foreman, being responsible for the safety of the mine and men employed therein, would be within his rights in resigning if, in his judgment, he was not being allowed to operate in safety. J. A. R.

Sullivan, Ind.

Treacherous Roof Conditions Are Not Always Discernible

SAFE timbering is a big problem and its execution should be left entirely in the hands of the men who are familiar with the roof conditions. Establishment of a uniform system is the only safe and economical method of handling timbering. The system should take care of all conditions which may arise and not merely meet the occasion when a crack in the roof is located.

Frequently the roof which looks good is found to contain a slip after the cut is blasted. It may be asked, "Why not examine the roof before beginning to load out a cut?" That should be done, of course, but not always does it reveal a weakened condition of the roof. So far as may be seen the roof may look sound enough and yet there may be a slip at the back of the cut.



Five-spot Timbering Method

I feel that Mac is not taking the right attitude in threatening to quit his job. If he would take Dad and Jim into his confidence and explain what he is up against, I feel they would be glad to follow his suggestions. No doubt they mean well and have only to be set right.

Dixonville, Pa. JAMES BACON.

Publications Received

Illinois Coal, by A. Bement. State Geological Survey, Urbana, Ill. Bulletin No. 56, 112 pp., illustrated. A non-technical account of the occurrence of Illinois coal, its production and preparation.

Anthracite in 1927, by O. E. Kiessling and H. L. Bennit. U. S. Bureau of Mines, Washington, D. C. Excerpt from Mineral Resources of the United States, 1927—Part II; 36 pp.

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

Coal Stripping Possibilities in Saline and Gallatin Counties near Equality, by Lloyd G. Henbest. Prepared under a co-operative agreement between the Illinois State Geological Survey Division and the Engineering Experiment Station of the University of Illinois, Urbana, Ill. Bulletin 32, 26 pp.; map.

List of Publications on the Geology of Illinois, with appended index. State Geological Survey, Urbana, Ill. 71 pp.

The Cleaning of Coal, by W. R. Chapman and R. A. Mott. Chapman & Hall, Covent Garden, London, England. 680 pp.: illustrated. Price, 42s. net.

Topographic and Geologic Atlas of Pennsylvania, No. 5, New Castle Quadrangle, with Geology and Mineral Resources, by F. W. DeWolf. Prepared by the Pennsylvania Geological Survey in co-operation with the U. S. Geological Survey; 238 pp.; illustrated. Price, $1.

Lists Necessary Elements Of Good Ventilation System

THE safest and most effectual method for ventilation of a mine is to divide the main air current into two or more splits, as near as possible to the main opening of the intake airway, each of these splits being used for the ventilation of separate districts of the mine. These splits, which are known as primary splits, should again be divided into secondary splits at any point in the mine in which such division can be accomplished to advantage. By this means each district of the mine is provided with its own circulation and receives purer air inasmuch as the return from any district in the mine is not conducted around the working face of any other district but passes directly into the main return airway.

If the system mentioned above were used I don't believe line brattices would be necessary in rooms in non-gaseous mines, although a curtain should be placed in the entry, where rooms are turned, a few feet inby the first room so as to deflect the air current up the room, through the crosscuts—assuming that crosscuts are used in rooms—and back to the return airway.

D. E. GRIFFITH,
Assistant General Manager,
Pruden Coal & Coke Co.

Pruden, Tenn.

Careful Planning Builds Up Dividends and Satisfaction

NO HARD and fast rule for timbering can apply to all large coal mines, as different sections of one mine almost invariably show different roof conditions. The nature of the strata must necessarily determine the measure of safety that must be used to render the roof safe to work under. The depth of the shaft, the width of the pillars left to maintain the roof and whether these pillars are to be taken out after the rooms are finished must be considered before any method can be developed to systematize timbering. The mine manager is the one best qualified to pass judgment on this important work, and his should be the last word in whatever method is adopted. He will, in any case, be the goat if anything should happen.

Whatever method is determined upon, safety should be the aim of all concerned, for the investment return cannot always be judged in terms of the number of timbers bought or money saved by economy in timber used, even though the number of accidents is such that the cost of the latter is less than the timber bill would be. The occurrence of accidents has a depressing effect on the morale of the men, reduces their efficiency and creates much dissatisfaction.

From an economic and humanitarian standpoint, therefore, it does not pay to adopt cheese-paring methods in supply-

ing timbers, and Mac is perfectly within his rights in demanding the "say so" as to how the timbers shall be placed. Ten thousand dollars can buy a lot of timbers, and the sense of safety which careful supervision begets is reflected in a smooth-functioning, harmonious and successful operation.

Panama, Ill. ALEXANDER BENNETT.

Foreman's Duty Is to Insure Safety by Good Timbering

MAC is right and Jim and the Old Man are wrong. No man, especially a mine foreman, has the moral right to take a chance on timbering. It doesn't pay to wait to timber a place that may become loose.

Just recently I had a whole entry block two hours by a fall of slate that could have been prevented with half the labor of cleaning it up if precautions had been taken at the proper time. And the extra labor required was only a part of the loss, which included a total stoppage of tonnage from that entry. In addition, the fall might have caught a man and caused a money loss out of all proportion to the timbering cost, to say nothing of the suffering of the injured and their dependents.

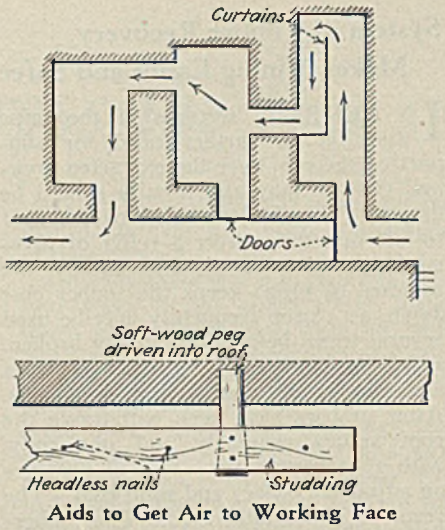
Yes, Mac would do the wise thing in quitting. There is a little law of self-preservation which even hogs must obey and we foreman must also pass under the badly timbered or non-timbered places—and live if we're lucky. If we don't get it, some other man will, and the man on top immediately says, "Fire that man [the boss] for incompetence." Even at that I think he is right, for if he is allowed to talk us into permitting dangerous conditions to continue, we are incompetent and should give way to the man who is not afraid to do the right thing regardless of first cost.

West Virginia. C. E. M.

Two Suggestions for Better Ventilation of Mine Workings

LACK of air at the face usually is due to one or more of the following reasons: Breakthroughs are not kept near enough to the face; rooms are not worked simultaneously and the room faces are staggered; stoppings leak; worked-out areas are unsealed and reduce the pressure and velocity of air currents at the face. Little wonder that neither gas nor smoke is swept away.

A good method of getting air to the face, that is, if the quantity of air conducted to the working section is sufficient in the first place, is shown in the accompanying illustration. The chief difficulty is that curtains strung close to the face are torn down by the concussion developed by blasting. In the arrangement shown the curtain or brattice is solidly nailed to within a safe distance of the face while the curtain in the remaining interval is hung from headless nails driven in a 2x2-in. studding. This studding is fastened to soft-wood pegs driven into holes in the roof.



Aids to Get Air to Working Face

Before blasting, the loosely hung end of the curtain is unhooked from these nails and refastened after shooting. Cotton rope may be used for guying the curtain at the floor. C. MCMANIMAN.

Rawdon, Quebec, Can.

Negligence in Mine Timbering Exerts Far-Reaching Influence

IF TIMBERS are not set according to some regular method great difficulties are likely to be encountered in subsequent operations. The weight of the strata will come on irregularly, resulting in heavy falls and loss of coal and timbers, at the same time endangering the lives of the workers. A closer inspection of timbering by officials and workmen doubtless would reduce accidents. So long as we persist in accepting an apparently good-looking roof as safe, and treating it as such, the present high rate of accidents due to falls will be with us. The only safe way is to regard all roof as unsafe.

Timbering should be left to the judgment of the good miner so long as he does not infringe upon the timbering rules already established. Mine bosses must insist that these rules be obeyed. Mac was right in taking the attitude he did, as any violation of what is stated or inferred by the mining laws, whether on the part of the owner or workmen, may result in disaster involving others as well as the persons violating the laws.

WILLIAM J. DAVIES.

Edwardsville, Pa.

Speed

COPY on the April problem for "The Bosses" should be in the office of *Coal Age* not later than April 20 in order to appear in the May issue.

First—Not Last—Is the Time To Do Good Mine Timbering

THE time to do good mine timbering is when the workings are advancing. All bad or heavy roof should be well timbered on the way in or, if it can be taken down with less expense, then take it down. It is better to take no chances.

The mine law calls for safe roof conditions and prohibits taking chances. If I were in Mac's place I would start figuring on another job if timbering were to be neglected. I believe, in addition, that timbering should not be left altogether up to the foreman, for the timbermen that follow the job every day benefit by the experience they receive and have as good ideas on the subject as the foreman. Experience is a great teacher and, while the foreman knows, he may overlook the details which competent men in direct charge will always keep in mind.

My system of timbering is based on doing it right and safely as you go. In that way you are always safe, lives and money are conserved in the long run and you need not worry about the visits of the mine inspector. A mine foreman has enough trouble without endangering lives and breaking the law, though the outside officials are apt to forget this fact and figure costs too close—forgetting that the final cost may come mighty high. All sides must be considered in mining cost these days and the haphazard boss is about to go.

Sagamore, Pa. FRED GAUL.

First Cost Does Not Decide

MAC is right in taking his stand on the timbering question, as the only way to reduce accidents is by systematically timbering all working places. In addition, safety posts, which have been put in use in a great many mines, when properly maintained are the greatest single factor in eliminating accidents.

As to taking changes on roof of a dangerous character, this expression should be eliminated by mining men if we are to reduce accidents. I don't believe timbering should be left entirely to the judgment of the mine foreman. A system should be adopted by the operating executives of the company and the foreman and his assistants should be required to enforce the provisions. Of course, conditions arise in the extraction of pillars and stumps where rules cannot be followed to the letter and timbering must be left to the good judgment of the foreman.

Mac should take up the timbering question with the Old Man and Jim again and try to convince them of the impractical and uneconomical results of their instructions before resigning his job. A mine foreman is not efficient if he produces a large tonnage at a low cost but with a high fatality rate, and he should not be classed as a good man. Surely the Old Man and Jim would not

permit Mac to resign because he has the safety of the mine at heart first, last and always!

High timbering costs are not due primarily to good timbering. In development work, for instance, the better a place is timbered and cared for, the less will be the expense of cleaning up falls. Setting a few posts is a very small item compared to the labor of removing even a single fall and perhaps installing a more expensive crossbar timbering job to keep the remaining roof in place. High timbering costs are not a result of unnecessary timbers set by miners and daymen but of inadequate timbering on pillars and in solid work—coupled with posts lost in the gob that should have been recovered.

Experienced workmen should be employed to recover timber with post pullers and a record should be kept of the number recovered and lost each day. It will be found that observance of the above rules will materially reduce timbering costs and increase safety.

VICTOR G. GANDY,
Hepzibah, W. Va. Mine Foreman.

Trade Literature

American Hoist & Derrick Co., St. Paul, Minn., has issued a folder illustrating and describing its new gasoline hoist and its two-speed drag scraper hoist.

Zilloy — The Perfected Non-Rusting Metal Roofing and Siding is illustrated and described in a 6-pp. bulletin issued by the New Jersey Zinc Sales Co., 160 Front St., New York City.

Wagner Electric Corporation, St. Louis, Mo., has issued Bulletin No. 161, 20 pp., containing instructions for the installation and operation of power and distribution transformers.

Diamond Drill Equipment and Supplies. Sullivan Machinery Co., Chicago, Ill. Catalog No. 85-B., 56 pp, illustrating and listing complete equipment and supplies for use with Sullivan diamond core drills.

Vibrex Screen. Robins Conveying Belt Co., 15 Park Row, New York City. Bulletin No. 73, 8 pp.; illustrated. Operation, mechanical features, mounting, dust cover, cloth replacement, drive, sizes are some of the points covered.

Pneumatic M.W.M. Benz Diesel Engines, Type RH75. Chicago Pneumatic Tool Co., 6 East 44th St., New York City. Bulletin 775, 23 pp.; illustrated. Describes the stages of combustion and fuel economy of these engines.

C-E Multiple Retort Underfeed Stoker, Super-Station Type. Combustion Engineering Corporation, 200 Madison Ave., New York City.

Electric Controller & Mfg. Co., Cleveland, Ohio, has issued the following bulletins: 1,100, Altitude and Pressure Regulators and Cushion Tanks—Alternating and Direct Current; 1,035, Safety Limit Stops for Alternating- and Direct-Current Motors; 960, Type V Dinkey Controllers for Direct-Current Motors, Plain Reversing and Form H Dynamic Braking; 1004-A, Type WB Brakes.

Aero Unit System for Firing Pulverized Fuel. Foster Wheeler Corporation, 165 Broadway, New York City. Bulletin 37.

Style "R" Newhouse Crusher. Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin 1469; 11 pp., illustrated.

Type K Underfeed Stoker. Combustion Engineering Corporation, 200 Madison Ave., New York City. Catalog K-2; 15 pp., illustrated. Describes the application of this stoker to boilers up to 200 hp.

W. A. Jones Foundry & Machine Co., Chicago, has issued catalog No. 42, covering a complete listing of its line.

The H-H Inhalator. Mine Safety Appliances Co., Pittsburgh, Pa. Four-page folder illustrating and describing the use of the inhalator in resuscitation work.

Hot Process Water Softener. Graver Corporation, East Chicago, Ind. Bulletin No. 5049. Tables are included showing savings made in various power plants by use of the softener.

System in Timber Recovery Makes Mining Easier and Safer

IN CERTAIN sections of the mine there is no further need for supporting the roof over the extracted areas and timbers may and usually should be drawn. This is done to allow the roof to fall and thus effect a relief of pressure on the pillars. Incidentally the removal of props keeps the timber cost down, as a prop frequently may be used several times before it is finally broken, and if broken may be cut into cap pieces and used in the construction of chocks. After timbers have been withdrawn the roof settles regularly and uniformly, with a corresponding relief of pressure on adjoining pillars and solid coal. The result is better lump coal. The timbers should be taken down as quickly as is consistent with safety.

Although timber drawing is hazardous work the danger of a creep or squeeze is greatly increased if timbers are not withdrawn. Rare judgment and experience are required in choosing the best order of drawing props, especially in waste of considerable area. It is best not to attempt the recovery of props surrounded by dangerous conditions.

C. A. PEAKE,
Kermit, W. Va. Mine Foreman.

Safe Timbering Methods Require Group Judgment

EVERY mining operation should adopt some system of timbering, but it should not stop there. Unusual conditions should be given special consideration by the foreman and other officials before changes are made in the system. In places where unusual conditions occur old, experienced miners should be worked.

Where bad roof is encountered on a haulway it should be supported by permanent construction, perferably of steel or concrete or both. Permanent wooden timbers should be kept as close to the face as the machinery used will permit. At no time should these timbers be more than 6 to 8 ft. from the face.

Timbering of a large mine should not be left to the sole judgment of the mine foreman for the same reason that his word is not entirely relied upon regarding other special problems. Furthermore, he does not have the time to give thorough consideration to roof safety. Another reason is that the majority of foremen do not have the knowledge or experience that would enable them to speak with authority on all questions of roof supporting. The foreman should submit his ideas to his superiors and together they should decide what changes should be made, considering safety and economy.

Mac has a just and sound reason for threatening to quit if he has shown the management why it is necessary to use more timbers than his bosses believe necessary and has made his case clear. But right here is where many men make a great mistake. They take their orders from superiors and pretend to carry them out without offering suggestions for modifications and changes that might to advantage be made. I believe that if Mac were to unfold his ideas and show the Old Gent and the "super," in terms of dollars, where he is right, things would be different.

H. T. WALTON.
Wheelwright, Ky.

Good Ventilation Essential

SECURING good ventilation at the face is a matter of difficulty in many cases and I should recommend carrying air to the inaccessible faces by means of flexible air hose and an independent fan, relying on brattice and stoppings to divert the air flow to the face. Ventilation by an independent air hose is likely to be expensive, as a separate fan is required as well as sufficient hose to reach from the fan to the coal face, but it has the advantage of supplying sufficient air just where it is wanted and ventilates blind ends where there is no natural circulation.

Flexible air hoses can be obtained strong enough to withstand the conditions in the mine, are sufficiently flexible to bend round corners and can be pushed right up to the coal face as the work progresses. The fan and pipe should be sufficiently large to carry enough air for proper ventilation, the end of the pipe discharging at the end of the working. The return air finds its way to the main workings by the circulation set up by the continuous discharge of fresh air at the face. This is the most efficient means of carrying air to coal faces which are situated a long distance from the main fan.

W. E. WARNER.
Brentford, England.

Recent Patents

Coal-Cutting Machine; 1,702,441. Austin Young Hoy, London, England, assignor to Sullivan Machinery Co., Chicago. Feb. 19, 1929. Filed Feb. 15, 1926; serial No. 88,404.

Loading Machine; 1,702,519. Norton A. Newdick, Columbus, Ohio, assignor to Coloder Co., Columbus, Ohio. Feb. 19, 1929. Filed Dec. 11, 1922; serial No. 606,235.

Coal Mining and Loading System; 1,702,558. Loyal F. Crawford, Pittsburgh, Pa., assignor to Goodman Mfg. Co., Chicago. Feb. 19, 1929. Filed March 3, 1928; serial No. 258,728.

Loading Boom; 1,702,563. Alfred B. Esseltine, Chicago, assignor to Goodman Mfg. Co., Chicago. Feb. 19, 1929. Filed March 4, 1926; serial No. 92,153.

Mining Machine; 1,702,571. Charles A. Pratt, Chicago, assignor to Goodman Mfg. Co., Chicago. Feb. 19, 1929. Filed Aug. 29, 1924; serial No. 734,848. Renewed Aug. 13, 1928.

Endless Conveyor for Coal Mines; 1,702,579. Edward Taylor, Ferryhill, England. Feb. 19, 1929. Filed Nov. 19, 1927; serial No. 234,510.

Safety Incline Car; 1,703,799. Albert G. Toney, Praise, Ky. Feb. 26, 1929. Filed May 28, 1927; serial No. 195,078.

Mining Machine; 1,703,807. H. N. Wood, Newcastle-on-Tyne, England, assignor to Jeffrey Mfg. Co., Columbus, Ohio. Feb. 26, 1929. Filed Jan. 27, 1925; serial No. 5,092.

NOTES

From Across the Sea

THAT bits will set fire to methane and to coal, that they will become dulled and even fused by heavy cutting is shown by the annual report of J. Masterton, government inspector in Great Britain for the Scotland division. At Garshore Colliery, Dumbarton, Scotland, an electrically driven chain machine was cutting a longwall face in a coking-coal seam, the thickness of which was 2 ft. 8 in. The coal lay fairly flat and had an uneven sandstone floor. The undercutting was being done in the seam but close down to the floor and the machine had advanced already some 45 ft. from the end of the face when suddenly a flame came out from the undercut.

The cutter switched off the electric current and ran for the fireboss. When he came 10 minutes later flame was seen under the cut in the coal for a distance of about 10 ft. in the rear of the machine. By means of flue dust and a piece of brattice cloth the flame was quickly extinguished. The cutter said he had seen sparks issuing from the cutter bits and added that the flame first appeared next to the cutter bar.

Next day it was found that the cutter bits had cut partly through a nodule of pyrite and that some of the bits were in contact with the hard sandstone floor. As a safeguard the cutter was set so as to cut 5 to 6 in. higher in the coal and a "wind diverter" was devised by the management to divert some of the ventilating current under the undercut so as to sweep out the gas. Pick points of a special steel were obtained which sparked less when held against emery wheels than those of ordinary steel and gave sparks of a dull red color. Whether such a provision would be a safeguard is doubtful, for the sparks do not seem to ignite gas so much as the heat of the rock being cut.

ANOTHER accident occurred at Valleyfield Colliery, Fifeshire, Scotland, in the Dunfermline Splint seam. A chain cutter driven this time by compressed air ignited gas in a short longwall face in a faulted area. The machine was cutting "across hill" (on the strike), where the steam rose at an inclination of 1 in 3. The seam being undercut was 2 ft. 10 in. thick.

Suddenly the noise of the cutting increased, indicating that something hard had been struck. The cutter was about to stop the travel of the machine when he saw a flash in the cut that lit up the face of the room, so he stopped operations immediately. A driller who was working 10 to 20 ft. behind the machine when the methane ignited said that shortly before the flame issued from the undercut he noted a shower of sparks. The officials being notified they traveled inby with the fresh air and saw flame ever and anon popping out of the undercut.

On examination it was found that the four picks in the chain which turned down toward the floor were all badly worn and had the appearance of having been melted at the points. The other pick points were in good condition. In order to ascertain just what had happened the coal was cut by hand from above the cutter bar and after care had been taken to exclude gas the machine was started in the presence of the government mine inspector, the agent and other officials of the colliery.

In a few moments a stream of sparks rained from the back of the cut. Then the cutter bar was swung out and it was found that 2 in. of floor coal had been left at the front of the cut but that the cutter bar had dipped into the floor at the back and cut a ridge the shape of the end of the cutter bar about $\frac{1}{2}$ in. deep in the white-rock floor. The floor was not dead smooth but had rolls 1 to 2 in. high. At one place where the machine had stopped a raised fossil stigmaria about $\frac{3}{4}$ in. high was found. This the machine had also touched. The filling of this fossil was of white rock and as hard as the rest of the floor.

R Dawson Hall

On the ENGINEER'S BOOK SHELF

Petroleum and Coal: The Keys to the Future, by W. T. Thom, Jr., associate professor of geology, Princeton University; 223 pp., 5½x9 in.; Princeton University Press, Princeton, N. J.; price $2.50.

Believing that there is an economic necessity "that shapes our ends, roughhew them how we will," Mr. Thom has written a book on petroleum and coal unmarred by the abuse that has been too common among authors. He does not wonder why the coal men have not invented a synthetic rubber to pave our streets or have not turned 1,000,000 tons of coal annually into aspirin to cure our headaches or 10,000,000 other tons into unbreakable plates and dishes. He realizes that it is difficult to find a new market for coal other than for power and heat. He finds no difficulty in understanding that the petroleum flood makes competition difficult.

Looking back in his introduction he sees how nations have become decadent from the exhaustion of minerals and realizes how they struggled, often in vain, to replace their depleted resources by others. Usually they failed, vanquished by economic pressure. Coal faces an equally inexorable, though different, misfortune, even though it must eventually emerge triumphant with the exhaustion of oil and the limitations to economy in the use of fuel.

In a thoughtful introductory chapter Mr. Thom says "the difference between the ancient and modern orders lies after all to a very minor degree in the increase of the absolute intellectual capacity of man, and to a dominant degree in the ability of the moderns to harness coal and oil, thus gaining access to metals which were inaccessible to the ancients and by the use of power-driven machinery bringing within the reach of the average citizen advantages once enjoyed only for the fortunate few."

The author describes the occurrence of coal and oil, the anxiety of the nations to increase their oil holdings and to guard the communications by which they can assure themselves of the oil they need. In the early history of the world it was metal, today it is oil, later it may be coal that will determine a nation's triumph or downfall, for oil's service to mankind, though great, will inevitably be fleeting. We may accept the dictum of Prof. Svante Arrhenius, at the First World's Power Conference, who put the relative total energy of the world's oil resources at unity and the relative total energy of the world's coal deposits at 367 or, with Professor Thom, we may reject that conclusion and give oil an importance "several fold" as great "in the light of recent improvements in geological and engineering methods," but in any event we shall be obliged to admit that the day of oil is short even if of impressive importance while it lasts.

* * * *

The American Mining Congress has added two standards which form part of the section on Outside Coal Handling Equipment of the "Handbook of Standard and Approved American Coal Mining Methods, Practice and Equipment," which was issued some few years back and has been supplemented at various times since that date. These standards relate to construction and maintenance of ladders and stairs for mines and to signals, hauling men on inclines, devices for hoisting and lowering men, tipple construction, fire protection, shafting, belt and gear drives.

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

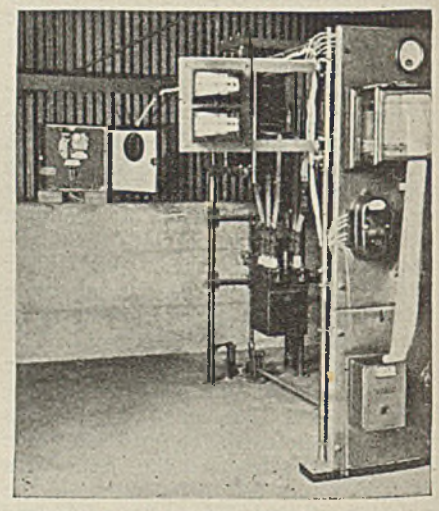
Demand Limiter Saves Its Cost In Five Months

CHANGE of the power-rate schedule from a contract demand to a metered 15-minute demand in sections of southern West Virginia during the past year was the incentive for successful attempts by a number of coal companies to lower the demand portion of their power bills. For the most part the reductions were effected by management—for instance by arranging to keep the pump load off of peak periods, reducing the size of haulage trips, and so on, but at one mine, at least, a reduction was effected by installation of an automatic load limiter.

This is in a substation which feeds the Brooklyn and Rush Run mines of the Scotia Coal & Coke Co., in the New River field. Results of the first month's operation indicate that the device will pay for itself in less than five months. This is conservative, because none of the saving is due to moral effect. Intelligent and fruitful measures to reduce peak loads had already been effected before the limiter was installed.

The particular instrument used by the Scotia company is the "Power Demand Limiter" made by the Steelcity Furnace Co., Pittsburgh, Pa. It consists of an impulse counting device, motor-driven clock which trips the counter every 15 minutes, and a relay for control of circuit breakers. These items are mounted in a steel box 18 in. square and 6 in. deep. The instrument must be used in conjunction with a watt-hour meter having a contact-making device. In this substation a G. E. type DW-7 5-amp. 110-volt watt-hour meter connected to 80-to-1 current transformers and 20-to-1 potential transformers is used.

It is connected in the incoming line at a substation which is the only supply for two mines. Three 200-kw. synchronous converters are installed therein. The limiter is mounted on the substation wall and but a few feet away from the meter. Contacts of the limiter relay are connected in series with the holding coils of two Automatic Reclosing Circuit Breaker Co. 600-volt 1,000-amp. type KSA breakers. Both breakers are held open by the limiter when it operates to limit the demand. During these periods all d.-c. power is cut off from the mines.

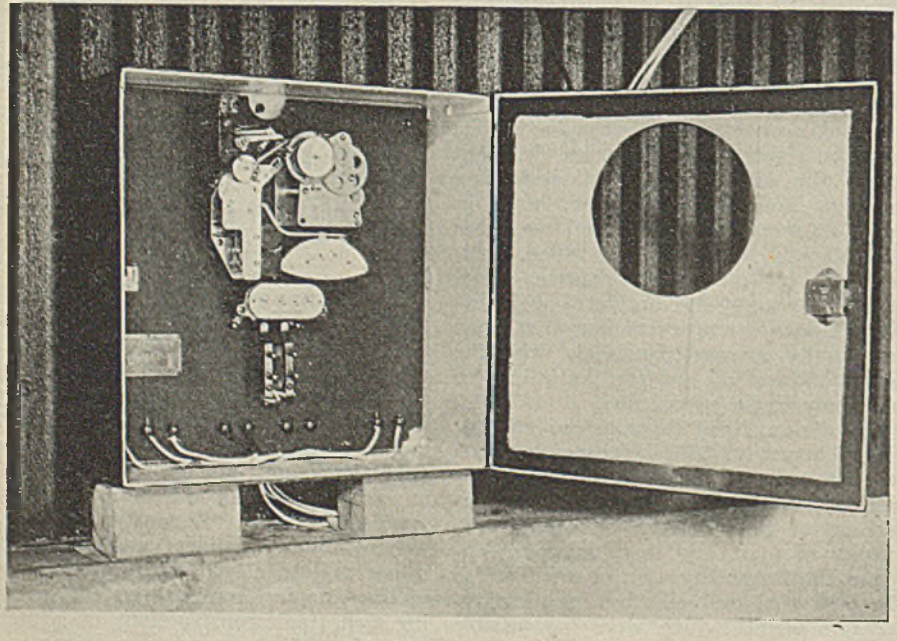


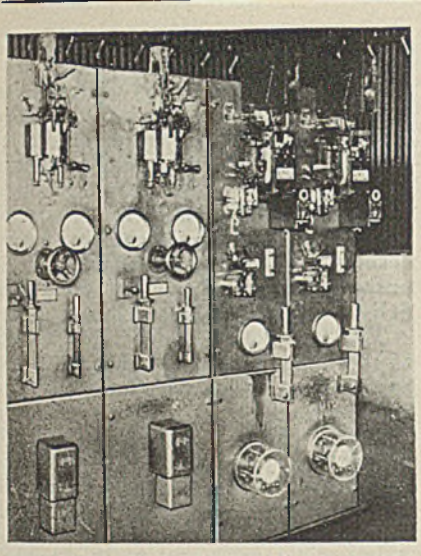
Limiter, Right, Connected to Center Meter of Panel

A condition which simplifies maintaining the limiter at maximum effectiveness is that the power company meter is located within 50 ft. of the substation where the limiter is installed. About once a day the electrician steps over to the power-company meter and determines by sight or hearing the exact time on his watch that the 15-minute demand interval ends. He then walks into the substation and after noting the number of seconds that have elapsed since leaving the power company meter sees if the time dial of the limiter indicates the same number of seconds past the tripping time. If not, the dial is set to correspond to that time so that the 15-minute intervals measured by the limiter will coincide with the 15-minute intervals of the power-company meter.

It should not be inferred from this that the limiter must necessarily be installed close to the power-company meter. It can be at any distance that the line arrangement makes convenient, and the checking can be done in the same way, or by telephone if there is a man stationed at each point.

With Cover Open to Show Mechanism





Limiter Opens Two Breakers on Upper Right-Hand Panels

The limiter does not limit instantaneous demand peaks but instead limits the average load. In reality it totals the kilowatt-hours of energy used during 15 minutes, then multiplies by four to indicate the average demand in kilowatts for the period. For that reason when it does open the circuit breakers, it does so usually within one-half to one minute of the end of the 15-minute cycle—in other words, just in time to hold the total kilowatt-hours consumed during the 15-minute period to one-fourth of the figure which has been set as the permissible maximum average 15-minute demand.

An unusual feature of the Scotia installation is that all d.c. power is cut off of both mines instead of off one circuit such as a pumping line that could be interrupted without directly affecting production. Because the pumping is done at night and the a.-c. day load is small or of short duration —for example, the intermittent hoisting of material on an incline which takes but 5 minutes per haul—it is necessary to cut off mine load. Were but one of the two feeder breakers opened, it probably would happen during some 15-minute period of excessive demand that the load on that feeder would be low and the load on the other high, thus defeating the limiter's attempt to control the 15-minute average.

J. C. Baker, general superintendent of the mines, cites the following figures indicating the saving effected after Oct. 1, when the limiter and new circuit breakers were put into operation:

	Kw. Metered Demand	Demand Billing	Tons Mined
September	455	$682.50	27,348
October	413	$619.50	30,879

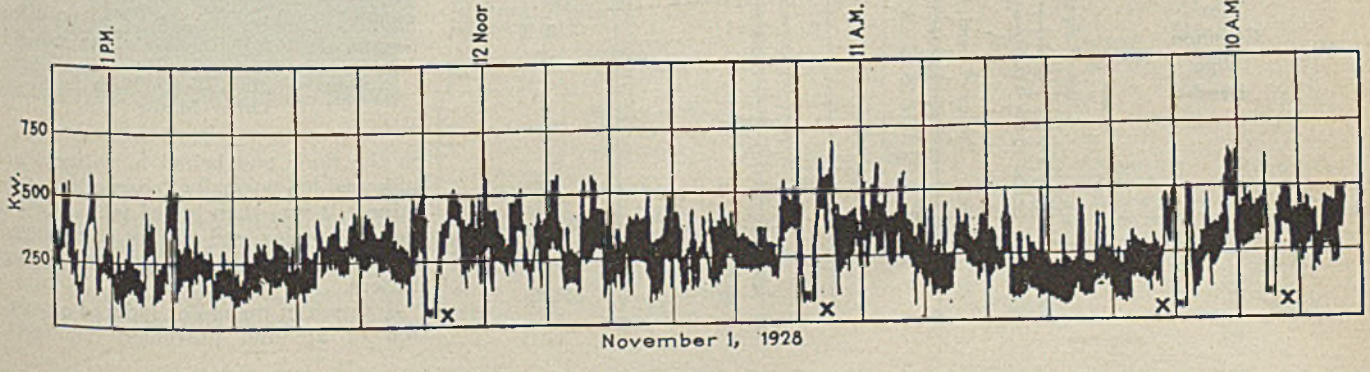
The saving on the October bill as compared to September was $63 and yet the tonnage was greater. Considering that the October demand probably would have been greater than the September demand, the actual saving was over $100.

To be charged against the saving in demand is a certain loss by delays to the mine while the circuit breakers are held open. This, Mr. Baker considers almost negligible. "All the limiter does is to cut off a few high peaks which do no good, and this does not hurt us a bit. We have it set so that it cuts the power off only four or five times a day and the average time it holds out is not much over one minute."

On Nov. 1, 1928, the day that the accompanying photographs were made, a graphic wattmeter showed that the breakers had been open four times up to 1:30 p.m. These four interruptions, presumably caused by the limiter, are shown on a section of the chart that is here reproduced.

Application of a load limiter is a local problem. Some mines have certain loads which can be cut off economically to reduce demand. Aside from the direct function, a limiter can be considered as a watchdog over regulations established to limit demand. It can be set to the economical minimum, then effort made to keep the demand under that value so that the circuits will not have to be interrupted.

Chart Showing Demand and Interruptions



The Easiest Way

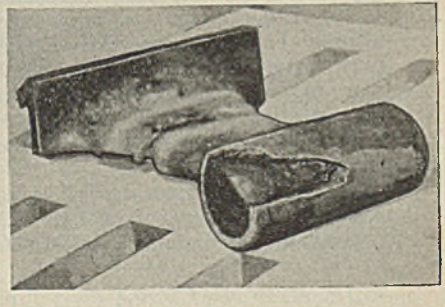
These columns are the meeting place of ideas for the solution of daily problems in getting out the coal. Here you are most likely to find the answer to the one that baffles you. And if you have a short cut, mechanical kink or an electrical problem send it in and receive $5 or more. A sketch or photograph will help to put it over.

Carbon Paste Assists Repairs by Welding

Repair of metal parts by welding is common practice today and the oxy-acetylene process is saving many valuable dollars which formerly went into the purchase of replacements, according to the Linde Air Products Co., New York City.

Now, when a casting is broken or defective, the damage is quickly remedied by the welding blowpipe. The same applies to a machine part or any metal piece which may have suffered a crack or complete fracture. When all of the broken parts are saved and delivered to the plant welder for repair, the job is comparatively simple, but when pieces are missing it is necessary to build up the missing sections with a filler core which will resist the heat of the welding flame. This is accomplished by using carbon paste.

The following description of the use of carbon paste shows the method employed on a casting where a piece was missing. The illustration shows a cast-iron support for a drill table. The break



Ready for Service

is first filled with carbon paste, which is smoothed to shape with a putty knife. It is necessary that the paste be packed in tightly so that the molten metal will stay where it is intended, thus saving considerable effort in grinding and machining after welding has been finished.

Near the center of this casing is a ¼-in. threaded hole for a setscrew, part of which was broken out. This hole is carefully filled, and after the welding is finished it usually is necessary only to rethread the hole. If carbon paste or carbon rod is not used for this purpose new holes must be redrilled and tapped. After the welding is completed the piece is annealed, and when cold the carbon paste is easily removed. The inside of the weld will be found to possess the correct contour and little or no finishing should be necessary.

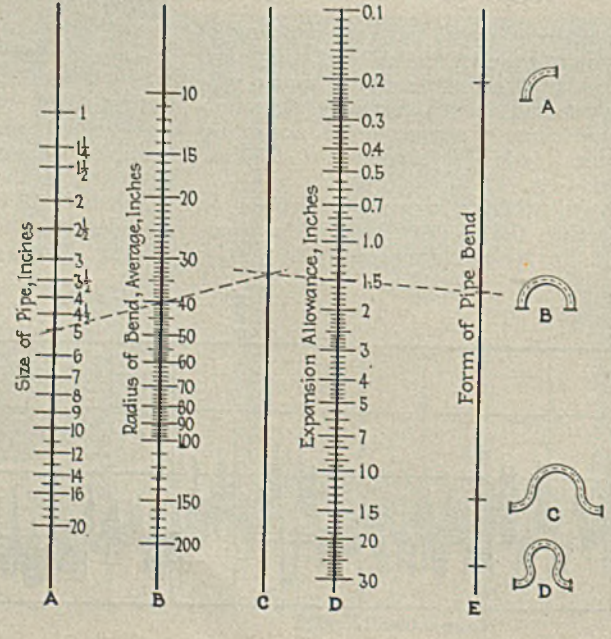
Chart Simplifies Pipe Bending

A practical chart for determining the average radius of common pipe bends has been devised by W. F. Schaphorst, mechanical engineer, Newark, N. J. In the accompanying chart the common forms of pipe bends are given in column E. Other columns give the size of pipe in inches, the radius of the bend and the expansion allowance. This chart might well be a part of the equipment of every shop.

To illustrate its use, a 5-in. pipe may be assumed as bent to a radius of 40 in., the bend being a common U-bend, as shown in column E. A dotted line is then run through 5 in column A, 40 in column B, and intersects column C. From this intersection another dotted line is drawn to the U bend in column E. This line will cross column D at 1.5 in., the expansion allowance for this bend. Similarly, if the expansion allowance, the form of bend and the size of pipe are known, the average radius to which the size of bend should be made is known. In other words, if any three of the four factors are known, the other may be ascertained.

The chart is based upon the following calculations: For bends No. 1 and 2, square the radius and multiply by 0.0026, and then divide by the outside diameter of the pipe in inches; for bends Nos. 3 and 4, use 0.0104 and 0.013 instead of 0.0026. In the chart the radii are squared, exact outside pipe diameters are employed and the proper factors used.

Eliminates Figuring for Common Pipe Bends



The Why of Equipment Longevity Explained

When a mining machine or locomotive performs extraordinarily in point of time and low maintenance cost, the conclusion can safely be drawn that few men have operated that piece of equipment and that consequently it has received good care. An illustration of this is the performance of a 17-year old locomotive in mines of the North East Coal Co., Paintsville, Ky., from which an original ball bearing was only recently removed and on which the original armatures with their factory windings continue in use.

Pals for 17 Years

The bearing was used on the pinion end of an armature on a 5-ton trolley locomotive purchased by the coal company in 1911. It has a brass or bronze retainer and carries the markings, "H B 7414—2798 B." It did not fail because of breakage or chipping but on account of slight wear which made it unsuitable for further use where a snug fit is desirable, as in an electric motor.

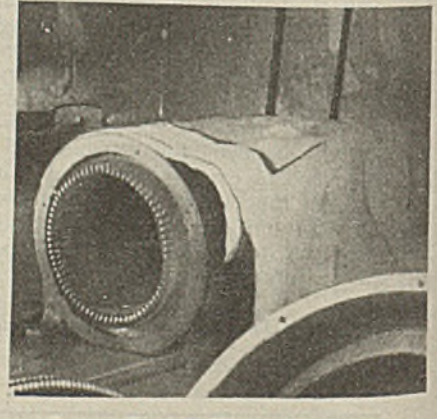
This locomotive has operated steadily as the mines in which it has been used have had no protracted shutdowns. One may legitimately ask how it is known that this bearing and the armatures still in use are those that came with the locomotive. These claims are vouched for by W. H. Hughes, chief electrician, who has been in personal touch with all repairs on the locomotive since its purchase, and who has an office record of each principal item of equipment. He is not certain, however, as to the number of motormen who have handled the locomotive, but thinks it is three, or possibly four.

This performance indicates the possibility of long life derivable from a ball bearing that is fitted properly to a particular use and furnishes proof of the advantage of inducing a good motorman to stay on the job.

Motor Drying Speeded by Driving the Rotor

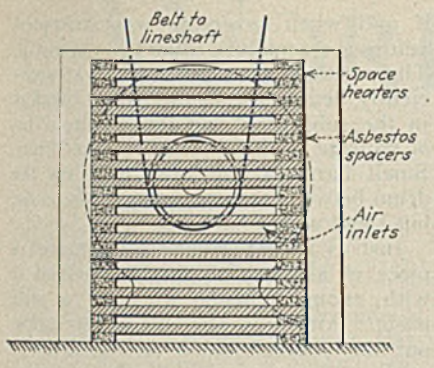
Drying two 150-hp. 440-volt pump motors in a repair shop after these motors had been submerged in a mine for nearly three weeks was effected by an unusual method, according to F. F. MacWilliams, of the Pennsylvania Coal & Coke Corporation, Cresson, Pa.

The motor to be dried first was placed on the floor and belted to a line shaft pulley which normally drives a shop machine. It was then boxed with asbestos and the pulley end of the box formed by a grid of fifteen electric space heaters.



Stator Getting Waste Heat from Other Motor

Rotation of the motor induced circulation of air and prevented hot spots.



Heater Arrangement

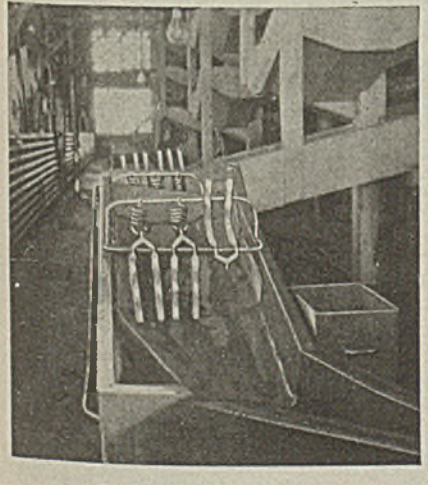
Because a temperature of 500 deg. F. was maintained in the box it was necessary to use steam cylinder oil to lubricate the motor bearings.

One motor was brought into the shop two days before the other. The stator end connections were removed to allow measurement of resistance between phases. After the motor was dried to a point where the resistance between phases and to ground was greater than one-half megohm, the windings were cleaned with gasoline and painted.

By this time the second motor had arrived and was ready to dry. In order to do this and at the same time dry the paint on the stator of the first motor, the box was extended and the stator placed at the end opposite the heater. This is the arrangement shown in the photograph.

Forks and Springs Control Flow of Coal

As a substitute for the steel rope or other devices ordinarily used to check the flow of coal in a chute, the breaker officials at the No. 5 breaker of the Jeddo-Highland Coal Co., Jeddo, Pa.,



Slackens Flow of Coal

have installed the novel device shown in the accompanying illustration. As may be seen, it consists of a number of forks bent to the proper shape and mounted on rods over the chute. These forks are made of strap iron or steel forged and bent to the proper shape and bored to fit over the supporting rod. The coil springs shown apply enough tension to keep the forks in position in the chute and prevent the too rapid flow of the coal. The springs are hooked through a hole in the back of the fork and may be unhooked to allow the fork to be lifted back out of the way when it is desired to let the coal run more freely or when the chute is not in operation.

Uses Rubber for Fiber In Packing Pumps

Fiber-packed water-piston pumps are very commonly troubled by loose adjusting segments, according to Charles W. Watkins, Kingston, Pa. If the packing is set too tight, rapid wear and loosening will result, after which the adjusting segments also will wear. Consequently, most pumps of this type that have had considerable use are likely to exhibit this condition.

In Figs. 1 and 2 is shown a regular fiber-packed water piston with three adjusting segments. Fig. 3 shows the adjusting segments and fiber packing removed and the piston packed solid with rubber. The use of rubber allows the adjusting segments to be discarded entirely. At the same time the pump may be run at higher speeds without shaking and consequent wearing of the packing.

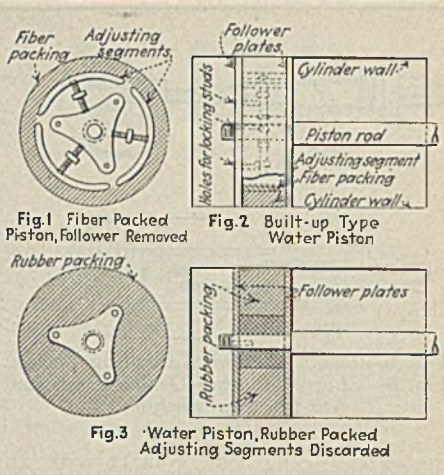


Fig. 1 Fiber Packed Piston, Follower Removed

Fig. 2 Built-up Type Water Piston

Fig. 3 Water Piston, Rubber Packed Adjusting Segments Discarded

Detailed Views, Fiber and Rubber Packed Pumps

Soft-rubber pump valves or regular sheet rubber such as is generally used at mines may be employed. The adjusting segments and fiber being removed, the layers of rubber are fitted in place. The fit around the center part and against the cylinder walls should be made as neat as possible. A little more rubber than is required to fill the space should be used so that the follower plate—when fastened on by means of the locknuts—will force it out against the cylinder wall and prevent leakage.

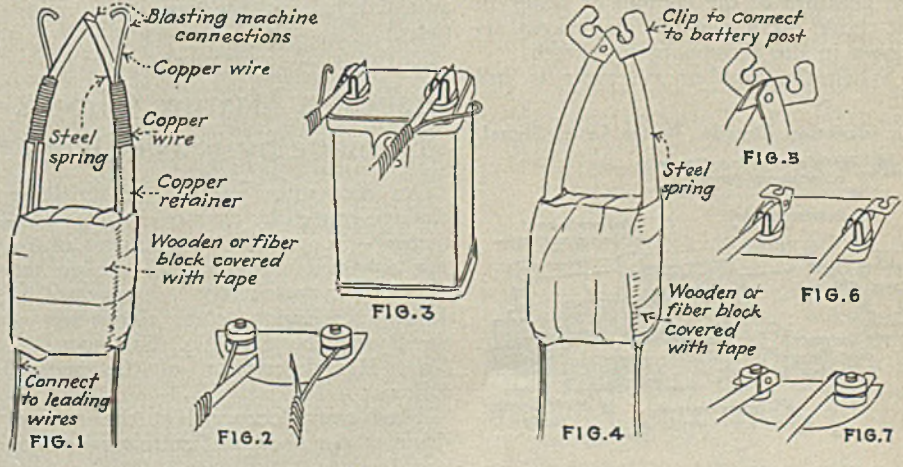
Protecting the Miner From Premature Detonation

ALTHOUGH firing explosives charges by electricity is the safest and most efficient method, accidents do occur with electric firing even when proper precautions are taken, declares S. C. Jones, technical representative, E. I. duPont de Nemours & Co., Inc., writing in a recent *Explosives Service Bulletin,* published by the duPont company

One of the chief hazards from the outset, and especially after electric cutting machines and loading machines were introduced in the mines, was that wires of an electric detonator as a blast-

Fig. 1—Easily Made Device for Short-Circuiting Leading Wires. Fig. 2—The Device Connected to the Ordinary Type Binding Post. Fig. 3—The Device Connected With the Spring-Type Blasting Post

Fig. 4—Alternative Form of Short-Circuiting Device. Fig. 5—Detail of Clip Attachment. Fig. 6—Type Shown in Fig. 4 Connected to Spring-Type Post. Fig. 7—Type Shown in Fig. 4 Connected to Ordinary Type Blasting Post



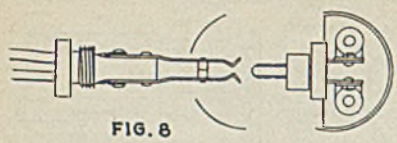


FIG. 8

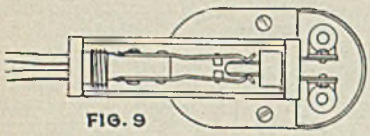


FIG. 9

Fig. 8—Detail of Short-Circuiting Device.
Fig. 9—Short-Circuiting Device Connected to Blasting Machine

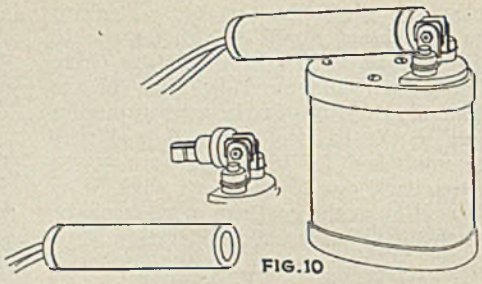


FIG. 10

Fig. 10—Radio Plug Employed in Constructing Short-Circuiting Device

ing circuit came into contact with an electrical source or with a stray current, which caused premature explosion of the detonator or the explosive charge. Consequently the explosive manufacturers attempt to guard against this contingency by twisting the ends of the iron detonator wires together and recommending that the ends of the leading wires be twisted together until they are attached to the blasting machine.

These precautions are not all-sufficient, however, and Mr. Jones describes two simple devices which further safeguard the use of electrical detonators. The construction of the first is shown in Figs. 1 to 7, inclusive, and consists essentially of two pieces of strong steel spring about ½ in. wide and 4 in. long, with a copper wire about 6 in. long secured firmly against the outer side of each spring by means of a winding of copper wire and a copper sleeve, and with a wooden or fiber block, covered with adhesive tape, placed between the steel springs and bound firmly in place with tape.

With the springs bound in this position the two rods come together and remain in contact, short-circuiting the leading wires until they are attached to the machine. The figures show the method of attaching to either the screw or spring binding post machines and an alternative construction embodying clips rather than the hooks, made of copper wire.

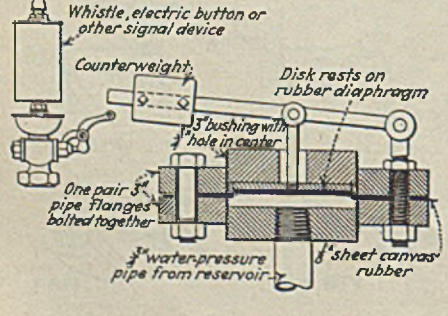
Figs 8 to 10, inclusive, show another form of the same device, consisting essentially of two posts, one of which is attached permanently to the posts of the blasting machine and the other to the leading wires. The first provides grooved brass-plate extension terminals for the machine, separated by a block of insulating material. The second forms the terminals of the leading wires and consists of two brass plates screwed to a block of insulating material with contact plates on their inner side which automatically close the circuit until the contacts are slipped over the extension fastened to the blasting machine A fiber cylinder is slipped over the terminals to prevent the circuit being accidentally broken.

Home-Made Alarm Device Watches Water Level

To substitute an automatic device for the human element, Charles W. Watkins, Kingston, Pa., recommends a warning signal for indicating the depth of the water in a tank or reservoir. The construction of a home-made type of signal, which operates by means of the pressure of the column of water in the tank on a rubber diaphragm, is shown in the accompanying sketch.

When the tank or reservoir is full the water pressure acts to raise the rubber diaphragm on which a metal disk attached to the regulating lever rests. A fall in the tank level decreases the pressure on the diaphragm and allows the lever to descend until it actuates a whistle or other signal device. By moving the counterweight back and forth on the regulating lever the pressure at which it will signal a dangerously low level of water may be adjusted to suit the operating conditions.

Construction Details: Water Level Signal



Asbestos Mixture Checks Damage by Flash-Overs

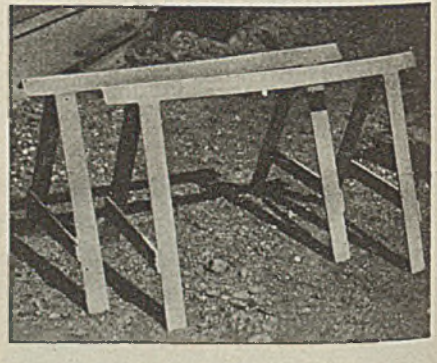
An economical method of repairing damage caused by flash-overs from contactor or controller mechanism, utilizing asbestos shingles and shellac too gummy for regular use, is suggested by Philip N. Emigh, chief electrician of the Byrne Gas Coal Co., Fairmont, W. Va. His description of the method follows:

Flash-overs occurred at the reverse drum of our shortwall cutting machines if and when reversing was attempted before the armature came to a standstill. The resultant arc sometimes was sufficiently heavy to trip the circuit breaker in the substation and cause quite a bit of damage to the wooden reverse drum. Small barriers had been built on the drum between the contacts and the ends, but these would burn out.

Just as an experiment I pulverized a piece of asbestos shingle and mixed it with enough shellac to make a stiff paste. After scraping off and gouging out the charred wood on the drum I applied the paste to the affected spots, building it a little higher than the contacts. The drum was allowed to bake overnight near an electric heater and by morning the compound was found to be about as hard as the original shingle and it also could be smoothed down neatly with a coarse file. The drum was put into service without further delay and, though it has since been in use for some time, no indications of flash-overs can be discerned.

Carpenter Horses Made By Oxwelding

Most plants or shops can use a pair of carpenter's horses and indeed few places are without these handy accessories. The trouble with most carpenter's horses, however, lies in the fact that they usually are made of wood and have a tendency to break or spread after they have been subjected to any hard usage. The plant welder of a large Eastern shop, according to the Linde Air Products, New York City, realizing these facts, constructed a pair out of some scrap angle iron. The finished product was an agreeable surprise to the carpenter's gang and a great improvement over the wooden ones that had been used in the past.



Horses That Stand Rough Work

It was a simple task to oxweld these pieces of scrap together. The accompanying illustration clearly shows the construction of the horse and the location of the welds. The pieces were all welded with butt-type joints and a small amount of welding rod added for extra strength.

WORD *from the* FIELD

Explosion in Kinloch Mine Kills Forty-Six Men

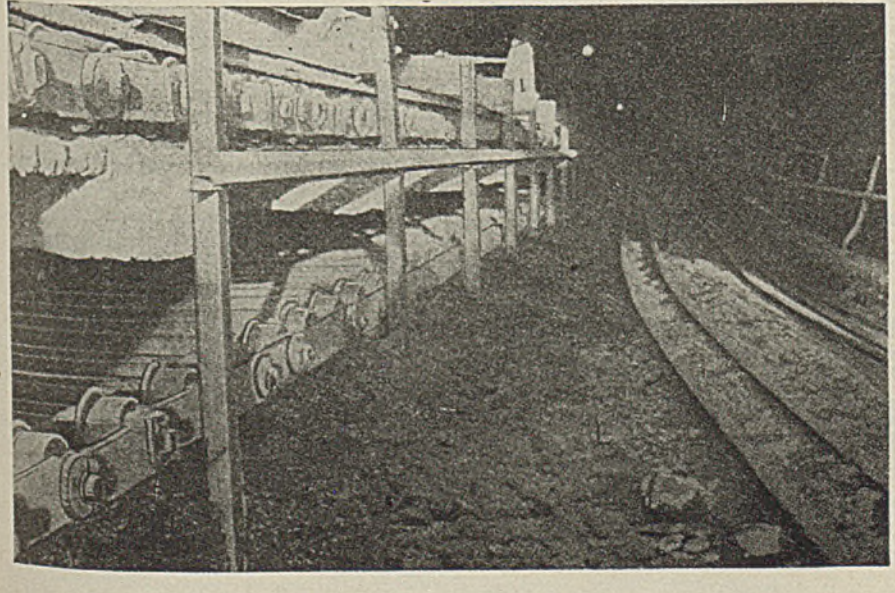
An explosion in the Kinloch mine of the Valley Camp Coal Co., near Parnassus, Westmoreland County, Pa., which occurred on March 21 killed 46 men. The cause is believed to have been the ignition of coal dust at the the foot of a slope by which coal is transported to the tipple by a conveyor. The blast took place in the early morning, a few minutes after the day shift had entered the mine. Two-hundred and sixty-six men escaped, the majority of them through connecting workings of an adjoining mine. William Eash, safety director of the company, was one of the victims. In this same mine an explosion took place on Feb. 20, 1928, in which 12 men lost their lives.

O. F. Taylor, superintendent of the mine, is said to have attributed the explosion to the breaking of the coal transporting conveyor in the main or slope opening. Consensus of opinion seems to favor Mr. Taylor but J. A. Paisley, president of the company, is reported to have expressed a belief that the explosion resulted from the planting of a bomb at the foot of the slope.

The Kinloch mine normally produces 3,500 to 4,000 tons of coal daily. The slope accommodates a track for the raising of slate and lowering of supplies, a stairway for man travel and an apron type conveyor for handling coal from the underground dump, 150 ft. below the surface, to the tipple. This slope lies on a pitch of 30 deg. and is 430 ft. long. The conveyor weighs approximately 40 tons and normally carried

a load of about 40 tons of coal. The theory is that this conveyor broke in two at the top and backed down the slope, pyramiding a jumbled mass of steel and coal at the bottom, which first threw coal dust into suspension and then caused a mechanical or electrical spark. The tipple, being in direct line with the slope, was badly damaged.

Kinloch Slope, Where Explosion Is Believed to Have Originated



Anthracite Region Engineers Hold Two Meetings

Paul Sterling declared, at the joint meeting of the Engineers' Society of Northeastern Pennsylvania and the Lehigh Valley section of the American Society of Mechanical Engineers, held at Scranton, Pa., March 21, that anthracite consumers want bright, shiny, bottle-glass coal. Anthracite preparation, he said, included something more than the cleaning of coal and the saving of the last pound of coal substance. Greater savings could be made by decreasing degradation than by keeping coal out of refuse piles.

Mr. Sterling declared that long before Aug. 31, 1930, when the present anthracite agreement would come to an end, the mine workers and operators would promulgate the fact that an understanding had been reached and its terms signed.

A film entitled "Wonders of Anthracite" was shown. This has been prepared to advertise the coal of the Lehigh Coal & Navigation Co. This popular presentation shows by moving pictures how the coal seams were laid down and folded and how the great ice sheet advanced over the land, flattening off the high peaks and carrying to destruction many promising square miles of good coal seams. Other pictures showed dinosaurs basking in primeval forests. Boy Scouts were shown finding coal by stumbling over it as Philip Ginter did in the early history of the region. The use of coal in the blacksmith's forge at the suggestion of an Indian also was illustrated and finally some scenes were shown of the surface and underground works of the Lehigh Coal & Navigation Co.

B. A. Musser, president of the E. S. of N. E. P., presided. Among those that spoke were W. G. Metzger, C. E. St. John, H. D. Baldwin, William Wilhelm and H. E. Detweiler. Thomas Evans spoke on the history of printing.

On March 22 the Lehigh Valley section of the American Institute of Electrical Engineers met at Wilkes-Barre, Pa. Addresses were made by Roy C. Haines, executive secretary, Anthracite Co-operative Association, on the prospects of the anthracite field and by John B. Taylor, General Electric Co., on "Making Sound Visible and Light Audible." Mr. Haines said that for the first time in three years there was an increase in anthracite shipments to New England. He believed the anthracite market was about to climb the hill again. The industry was paying 41 per cent of its income in taxes, national, state and local, a burden too heavy for any industry to sustain. The value of the coal properties has fallen a billion dollars and the bank deposits of the region have declined forty million dollars.

C. W. & F. and Stonega Form New Company

A new company, the Admiralty Coal Corporation, has been formed to take over operation of the properties of the Stonega Coke & Coal Co. in the New River district, and of the Eccles mines located near Beckley, W. Va. This new company will be controlled by the Stonega Coke & Coal Co., Philadelphia, Pa., and the Chicago, Wilmington & Franklin Coal Co., Chicago.

It is planned to enlarge all of the mines involved in the near future, and to equip them with the most modern preparation and loading equipment. The production from the mines will be distributed through the General Coal Co., with headquarters in Philadelphia, and the Chicago, Wilmington & Franklin Coal Co. in Chicago.

The executive officers of the Admiralty Coal Corporation will be Otis

Mouser, chairman; George B. Harrington, president; R. H. Knode, vice-president; L. D. Smith, vice-president; L. F. Lentz, secretary, and K. F. Towler, treasurer.

The joint ownership of this new smokeless coal company constitutes an alliance of an Eastern and a Western coal organization, each member of which is one of the oldest and best known in its respective territory. The General Coal Co. distributes exclusively the production of the Stonega Coke & Coal Co., the Westmoreland Coal Co. and the Hazle Brook Coal Co., as well as distributing important tonnages of bituminous and anthracite coal from other properties. The Chicago, Wilmington & Franklin Coal Co. owns the Orient mines, located in Franklin County, Illinois, and does an important business on other coals in the West.

New Plants and Equipment To Be Installed

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

Ashless Coal Sales, Inc., Lexington, Ky.; contract closed with the American Coal Cleaning Corporation for air tables, capacity 75 tons per hour, to clean 2x0-in. coal. This is to be a central cleaning plant working 20 hours per day and handling coal from several mines in the Hazard field. To be completed in six months and extended as future business warrants.

Clinton Block Coal Co., Imperial, Pa.; contract closed with Roberts & Schaefer for combination Menzies Hydro-Separator and Arms air-concentrator coal-cleaning plant, capacity 150 tons per hour. To be completed Aug. 1.

Dragon Coal Co., Morgantown, W. Va.; new tipple equipped with shaking screens, loading booms and mixing conveyor being erected by the Morrow Manufacturing Co. Capacity, 125 tons per hour; completion date, April 15.

Ennis Coal Co., Hiawatha, W. Va.; Menzies Hydro-Separator coal-cleaning equipment, capacity 50 tons per hour, being installed by the Roberts & Schaefer Co. To be completed May 1.

Erie Canal Coal Co., Boonville, Ind.; new steel tipple, capacity 1,000 tons per hour, and electric hoist being built to replace old plant destroyed by fire. Construction work being done by the International Steel & Iron Co.; shaker screens being installed by the Earlington Machine Works.

Greenbrier Coal & Coke Co., McDowell, W. Va.; contract closed with the American Coal Cleaning Corporation for air tables, capacity 70 tons per hour, to treat ½-in. slack. To be completed May 15.

Hillman Coal & Coke Co.; Jerome, Pa.; contract closed with Roberts & Schaefer for Menzies Hydro-Separator coal-washing equipment, capacity 50 tons per hour. To be completed June 1.

Humphreys Coal & Coke Co., Greensburg, Pa.; new preparation plant, capacity 100 tons per hour, using American air tables now under construction. Pangborn dust arresters and dust classifiers are part of the equipment. To be completed about April 15.

Merrill Coal Mines, Inc., Henlawson, W. Va.; contract closed with the American Coal Cleaning Corporation for six air tables, capacity 200 tons per hour of 3x0-in. coal, and an American bag-type dust filter with auxiliary equipment. Tipple to be constructed by the Pittsburgh Coal Washer Co.

Point Mountain Coal Co., Webster Springs, W. Va.; new tipple completed, capacity 500 tons per day. Equipped with bar screens to prepare lump, egg, nut and slack from the Sewell seam.

United Electric Coal Cos., Danville, Ill.; all-steel Jeffrey 6-track tipple now under construction at Duquoin, Ill. Hummer screen equipment will be installed for rescreening the small sizes. Capacity, 8,000 tons per day.

Wheeling & Lake Erie Coal Mining Co., Cleveland, Ohio; new tipple, capacity 120 tons per hour, now being constructed at Fairpoint, Ohio. Link-Belt-Simon-Carves washing equipment will be installed and three sizes of coal will be prepared. To be completed in August.

Repplier Coal Co. Expands

The Repplier Coal Co., Buck Run, Pa., has been purchasing the properties of residents of Upper New Castle, at the top of Broad Mountain, in order to extend its anthracite stripping operations. The company is controlled by Thorne, Neale & Co.

Southern Appalachian Men Organize Exchange

The Southern Appalachian Coal Exchange was organized March 22 as an auxiliary to the Southern Appalachian Coal Operators' Association at a meeting of the latter organization held at Knoxville, Tenn. The new exchange will endeavor to improve trade practices, where needed, and the organizers believe that the standards in selling bituminous coal in that field will be raised.

Guy Darst, treasurer, Holmes-Darst Coal Co., Knoxville, was elected president of the exchange; C. M. Moore, general manager, Red Ash Coal Co., Knoxville, vice-president, with a board of governors composed of the following: E. C. Mahan, president, Southern Coal & Coke Co., Knoxville; J. E. Butler, general manager, Stearns Coal & Lumber Co., Stearns, Ky.; Frank Garland, Southern sales manager, Blue Diamond Coal Co., Knoxville; C. W. Rhodes, vice-president, Fork Ridge Coal & Coke Co., Fork Ridge, Tenn., and F. F. Floyd, Knoxville, in addition to Mr. Darst and Mr. Moore. R. E. Howe, secretary of the Southern Appalachian Coal Operators' Association, will be commissioner of the exchange.

Advances Here and Abroad Engage Mining Institute

One of the most successful meetings in the history of the Rock Springs Chapter of the Rocky Mountain Coal Mining Institute was held March 13, in the Masonic Temple, Rock Springs, Wyo. About one hundred were in attendance. The speakers were Prof. A. C. Callen, head of the mining engineering department, University of Illinois; Eugene McAuliffe, president, Union Pacific Coal Co.; Hans Mueller, Freiburg, Germany, and S. E. Graf, University of Berlin.

Professor Callen told of his work in the mining department of the University of Illinois, described a number of problems in the coal industry and closed with a plea that the operators provide opportunities for young engineers just out of school to obtain practical experience in the mining profession.

Mr. Graf's paper described the use of shaker conveyors in German mines. He detailed many of the difficulties in mining in his native country, particularly with regard to backfilling. In many instances, he said, material had to be hauled many miles for this purpose, the German mining law requiring backfilling in all cases, as coal operations often are in the vicinity of thickly settled communities.

The tremendous growth of the lignite industry in Germany was described by Mr. Mueller. Faced with the necessity of providing fuel for the growing industries of that country, it was found that by producing lignite by large-scale stripping operations it was possible to reduce production cost to such an extent as to be able to compete with fuels of

Anthracite Prices at New York Effective April 1, 1929

(Per Gross Ton, F.O.B. Mine)

	Broken	Egg	Stove	Chestnut	Pea	Buckwheat	Rice	Barley
Lehigh & Wilkes-Barre Coal Co.	$8.00	$8.15	$8.65	$8.15	$4.40	$2.75	$2.00	$1.50
Delaware, Lackawanna & Western Coal Co.	7.90	8.15	8.65	8.15	4.40	2.75*	2.00	1.50
M. A. Hanna Co.	7.90	8.15	8.65	8.15	4.40	2.75	2.00	1.50
Philadelphia & Reading Coal & Iron Co.	7.90	8.15	8.65	8.15	4.40	....	....	....
Lehigh Valley Coal Sales Co.	7.90	8.15	8.65	8.15	4.40	2.75	2.00	1.50
Hudson Coal Co.	7.90	8.15	8.65	8.15	4.40	2.75	2.00	1.50†
Lehigh Coal & Navigation Co.	7.90	8.15	8.65	8.15	4.40	2.75	2.00	1.50†
General Coal Co.	7.90	8.15	8.65	8.15	4.40	2.75	2.00	1.50
Kingston Coal Co.:								
No. 2 and Gaylord	....	8.15	8.65	8.15	4.40	....	....	....
No. 4 Mine	....	8.40	8.90	8.15	4.65	....	....	....
Dickson & Eddy	....	8.15	8.65	8.15	4.40	....	....	....

*Domestic buckwheat $3.25. Birdseye, $1.75. Buckwheat No. 4, $1.00.

higher thermal value. It was practicable, he said, to operate strip mines where the ratio of thickness of overburden to seam was five to one. He stressed the fact that the overburden was replaced when mining operations had been completed, making the ground available for agricultural use.

Commenting on the papers of Messrs. Graf and Mueller, Mr. McAuliffe emphasized the great difficulties of mining in Germany, due to the extreme depth of the operations, as contrasted with the comparatively shallow cover encountered in the coal fields of this country. The accident rate in the mines of Germany and other European countries, he declared, was about one-third as high as in the United States.

More Men, Lower Earnings At Mines in January

Employment in coal mining—including anthracite and bituminous — increased 0.1 per cent in January, 1929, as compared with the preceding month, while payrolls decreased 5.1 per cent, according to the monthly *Labor Review* of the U. S. Department of Labor. The 949 mines for which reports were received had 216,220 employees in January with payroll totals in one week of $5,710,564.

Employment in anthracite mines alone was 1.5 per cent lower in January than in the preceding month and payroll totals were 10.7 per cent lower. The considerable decrease in payroll totals was largely due to part-time work reported by a number of collieries. Returns were received from 91 collieries having 67,220 employees in January and payroll totals in one week of $1,977,808, the same mines reporting in December 68,232 employees and payroll totals of $2,215,231 in one week.

Employment in bituminous mines increased 0.9 per cent in January as compared with the preceding month and payrolls decreased 1.8 per cent. Settlement of a wage-scale disagreement in one region of the Mountain geographic division, which was noted in the December report, is shown in the increase in payroll totals in that division; reports from two states in the East North Central division showed that several mines which were idle in December had resumed work in January, and a number of mines in the West North Central division reported more employees and steadier operating time in January. The remaining five divisions in which bituminous mines are represented reported considerable irregular operating time.

Details for each geographic division are shown in the accompanying table.

Barrier Pillar Legislation Up to Governor Fisher

The State House of Representatives at Harrisburg, Pa., has passed finally the bill of Senator Harry B. Scott, Centre County, providing for the maintenance of pillars between mines in the bituminous region. The bill had passed the Senate and now goes to Governor Fisher for action. The bill which was drafted by a special state commission that made an investigation of the matter, is said to be satisfactory to the bituminous operators.

Thin-Seam Mine Closed

Whitehouse Mine of the North-East Coal Co., in the Big Sandy field of eastern Kentucky, was shut down March 22 and its operation discontinued. In a statement to the company employees H. LaViers, manager, said, in effect, that the coal is too thin to be mined at a cost below the selling price. The mine is in the Miller's Creek seam and the coal thickness is 36 to 44 in. Besides this operation, which was rated at 500 tons per day, the North-East company has three other mines in the field.

Employment and Payroll Totals in Identical Bituminous Coal Mines During One Week Each in December, 1928, and January, 1929

Geographic Division	Mines	Number on Payroll Dec., 1928	Number on Payroll Jan., 1929	Per Cent Change	Amount of Payroll Dec., 1928	Amount of Payroll Jan., 1929	Per Cent Change
Middle Atlantic	245	47,883	47,200	— 1.4	$1,279,743	$1,214,464	— 5.1
East North Central	130	22,834	25,281	+10.7	674,016	692,535	+ 2.7
West North Central	47	4,509	4,642	+ 2.9	115,286	123,275	+ 6.9
South Atlantic	208	31,500	31,096	— 1.3	789,007	747,696	— 5.2
East South Central	155	30,943	30,487	— 1.5	646,998	634,428	— 1.9
West South Central	25	1,830	1,876	+ 2.5	50,742	50,079	— 1.3
Mountain	40	6,735	6,952	+ 3.2	196,908	225,868	+14.7
Pacific	8	1,485	1,466	— 1.3	47,062	44,411	— 5.6
All divisions	858	147,719	149,000	+ 0.9	$3,799,762	$3,732,756	— 1.8

Per Cent of Change in Each Line of Employment, December, 1928, to January, 1929

Line of Employment	Establishments	Employment Dec., 1928	Employment Jan., 1929	Per Cent Change	Payroll in 1 Week Dec., 1928	Payroll in 1 Week Jan., 1929	Per Cent Change
Manufacturing	12,138	3,302,534	3,321,227	— 0.3*	$89,979,694	$87,564,382	— 3.3*
Coal mining	949	215,951	216,220	+ 0.1	6,014,993	5,710,564	— 5.1
Anthracite	91	68,232	67,220	— 1.5	2,215,231	1,977,808	—10.7
Bituminous	858	147,719	149,000	+ 0.9	3,799,762	3,732,756	— 1.8
Metalliferous mining	290	46,591	46,754	+ 0.3	1,394,794	1,339,641	— 4.0
Public utilities	6,404	494,219	483,948	— 2.1	14,276,770	14,162,259	— 0.8
Trade	2,913	217,253	179,236	—17.5	5,047,509	4,439,879	—12.0
Wholesale	1,146	34,737	33,888	— 2.4	1,013,601	997,576	— 1.6
Retail	1,767	182,516	145,348	—20.4	4,033,908	3,442,303	—14.7
Hotels	1,041	110,544	111,943	+ 1.3	1,921,365†	1,924,973†	+ 0.2
Total	23,735	4,387,092	4,359,328	— 0.6	$118,635,125	$115,141,698	— 2.9

*Weighted per cent of change; remaining percentages of change, including total, are unweighted.
†Cash payments only

Co-operation and Research Urged on Anthracite Men

Co-operation between producers and wholesale distributors of anthracite on the one hand and retail distributors on the other hand, has been marked in last few years, declared Thomas Dickson, of Dickson & Eddy, in an address delivered at the annual meeting of the New York group of the New York State Coal Merchants' Association held in New York City on March 21. Wholesale and retail distributors of anthracite, Mr. Dickson said, can survive and progress only as this spirit of co-operation is developed to the utmost practicable limits.

"But," he went on, "there is still a long road ahead of us. Retailers must familiarize themselves with the needs, wants, desires and individual peculiarities of consumers, and in turn, pass these findings to us as producers and to wholesale distributors, so that working in unison we all will devote our best intelligence to solving, for the best interests of all concerned, the problems thus presented."

Mr. Dickson pleaded with the retailers to assist in spreading distribution more evenly over the year and reducing the peak loads to help to lower producing costs.

Only recently, he said, has the anthracite industry realized what scientific research held in store, "and although we have not as yet organized such work on a basis commensurate with the needs of the industry, the studies which we have made have disclosed many neglected opportunities."

Better merchandising methods must be studied, he said, as customers have been lured to more expensive and less dependable fuels mainly through the claim of "greater convenience." Automatic stoking, heat control and ash removal are all available to anthracite users through the medium of efficient, economical devices which the industry has neglected properly to bring to their attention.

"We are living in a rapidly moving age," continued Mr. Dickson. "We must meet rapidly growing needs of the public. We must, if possible, learn these needs and wants before they do, so that we can offer them new ways, new means, 'new models,' so to speak, before they take the initiative in demanding them.

"Industry in this country has been distinguished for its ability to produce. Intensive competition in all fields now makes major problems of distribution and sales. Research is both the oldest and one of the newest approved methods of acquiring an understanding of previously unknown or misunderstood conditions.

"Research discloses ways and means of enticing customers to the very limit of their capacity to purchase. Research draws producer and consumer closer together, putting their wants and needs on common ground. Research points the way to elimination of costly wastes —not only waste of material, waste of capital and waste of effort, but the

waste born of unfair competitive methods.

"Unfair competition is an economic evil which feeds upon itself and thereby accomplishes its own destruction more certainly than the destruction of the competitor it hopes to destroy. Only so far as competition is fair and honest does it give life to industry. Through research I believe we will in time be educated to do away with all these wasteful kinds of effort. Then our anthracite industry will quicken its strides of progress and conditions throughout it will be more satisfactory and profitable to all of us."

Coming Meetings

American Welding Society; annual meeting, April 24-26, at 33 West 39th St., New York City.

Chamber of Commerce of the United States; seventeenth annual meeting, April 29-May 3, Washington, D. C.

American Management Association; annual spring convention, week of May 6 at Hotel Pennsylvania, New York City.

Mine Inspectors' Institute of America; annual meeting, May 7-9, at Whittle Springs Hotel, Knoxville, Tenn.

International Railway Fuel Association; annual meeting, May 7-10, at Hotel Sherman, Chicago.

Western Canada Fuel Association; annual meeting, May 13-15, at Drumheller, Alberta, Canada.

American Mining Congress; annual convention and exposition of mining machinery, May 13-17, at Cincinnati, Ohio.

National Retail Coal Merchants' Association; annual meeting, May 27-29, at Chicago, Ill.

National Association of Purchasing Agents; annual convention, June 3-6, at Hotel Statler, Buffalo, N. Y.

American Wholesale Coal Association; annual convention at Pittsburgh, Pa., June 11 and 12.

Colorado and New Mexico Coal Operators' Association; annual meeting June 19, at 513 Boston Building, Denver, Colo.

American Institute of Electrical Engineers; annual summer convention, June 24-28, at Swampscott, Mass.

Illinois Mining Institute; annual meeting and river trip on Steamer Cape Girardeau, leaving St. Louis, Mo., June 27 and returning June 30.

American Society of Mechanical Engineers, July 1-4, Salt Lake City, Utah.

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

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

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

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

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

Bureau of Mines Issues Permissible Plates

Two approvals of permissible mining equipment were issued by the U. S. Bureau of Mines during March, as follows:

(1) Duncan Foundry & Machine Works, Inc.; turntable-type Duncan conveyor, mine car loader; General Electric 1-hp. motor and control, 250 volts, d.c.; approval 166; Duncan Foundry & Machine Works, Inc., March 13, 1929.

(2) The Brown-Fayro Co.; model LC special, "Brownie" mine-car loader; Crocker-Wheeler Electric Mfg. Co. 1.5-hp. motor and control, 250 or 500 volts, d.c.; Approvals 167 and 167A; Brown-Fayro Co., March 27, 1929.

Anthracite Tax Repealer Goes to State Senate

The State House of Representatives at Harrisburg, Pa., on April 1 passed the Jones bill repealing the anthracite tonnage tax. The vote was 160 to 16 and it was taken without debate or any statement by its sponsor or other member. The bill now goes to the Senate for action before being submitted for Governor Fisher's approval. The tax now brings into the State Treasury $12,500,000 during each biennium.

It is believed to be certain that the Senate will pass the Jones bill, and the Heaton bill, which provides for the repeal of the coal tax after one more year's collection, may also be passed on to the Governor's desk.

Burns Bros. Open in Boston

Burns Bros., of New York City, have been appointed sales agents for the Lehigh Valley Coal Corporation in Massachusetts, effective April 1, and have established offices at 141 Milk Street, Boston. The announcement, which was made March 27, is in line with similar announcements made that the firm would act as sales agents for the Lehigh Valley company's product in Syracuse and Rochester.

The coal in Massachusetts will be handled through the Steamship Fuel Co., a subsidiary of Burns Bros. The company's new Boston offices have hitherto been occupied by the Lehigh Valley Coal Sales Co.

Change in Base Rate Stands

The Interstate Commerce Commission refused on April 3 to suspend tariffs filed by the Pittsburgh & Lake Erie and the Pennsylvania railroads on rates from the Pittsburgh district to eastern destinations. The proposed change in rates has the effect of placing about 140 mines now in the Pittsburgh group for rate-making purposes, eastbound, in the Westmoreland group, resulting in a 15c. reduction for the mines so changed. The tariffs were protested by the central Pennsylvania operators and by other districts affected.

Coal Mines Win Awards For Safety Records

Certificates for meritorious achievements in safety work were awarded to five coal mines and to two coal miners by the Joseph A. Holmes Safety Association at its annual meeting at the Bureau of Mines, Washington, D. C., on March 5. Several medals and diplomas also were voted to workers in metal mines for acts of heroism. The awards to coal companies were as follows:

O'Gara Coal Co., Harrisburg, Ill., for having operated without a single accident nine mines with an average of 2,300 employees throughout the year 1928 with an output of 1,313,206 tons; mine No. 4, United States Coal & Coke Co., Thorpe, W. Va., for having worked an average of 257 men a total of 1,279,328 man-hours without a fatal accident; mine No. 12, Madison Coal Corporation, Dewmaine, Ill., for having worked an average of 760 men for the last three years, producing 1,879,523 tons of coal, without a fatality and for having worked an average of 633 men through a seven-year period with an output of 802,434 tons per fatality; Panther mine of the United States Fuel Co., Heiner, Utah, for having during the last three years worked an average of 87 men a total of 376,324 man-hours without a fatality; Johnstown division, Bethlehem Mines Corporation, for having worked in 1928 six mines with 1,700 employees, producing 2,132,562 tons of coal, with only one fatality.

F. E. Middleton, of the Stewart mine of W. J. Rainey, Inc., at Southwest, Pa., received a certificate for having completed 24 years' service as an official working an average of 200 men with only one fatal accident. David Muir, mine foreman, Robinson No. 1 mine, Colorado Fuel & Iron Co., at Walsenburg, Colo., was honored for having completed 13½ years' service, producing about 2,500,000 tons of coal, without a fatal accident.

A.I.M.E. Appoints Year's Committee Heads

At the meeting of the board of directors of the American Institute of Mining and Metallurgical Engineers, in New York City, March 15, H. N. Eavenson was reappointed chairman of the coal and coal products committee, A. C. Callen of the mine ventilation committee, George S. Rice of the ground movement and subsidence committee and E. A. Holbrook of the engineering education committee. G. O. Smith succeeds Harrington Emerson as chairman of the production control committee. F. W. Bradley succeeds G. A. Packard as chairman of the mining methods committee.

Arrangements were made so that H. Foster Bain, the secretary, could take a vacation of ten weeks or more to make an investigation and report on the oil situation in the United States of Colom-

bia on behalf of the government of that republic. M. W. von Bernewitz will be granted leave of absence by the U. S. Bureau of Mines to assist temporarily in the headquarters office of the A.I.M.E. in the secretary's absence.

Would Waive Certificates During Strikes

State Senator George Woodward, of Philadelphia, has introduced a bill in the Pennsylvania Legislature at Harrisburg which would permit operation of anthracite mines in the state during strike or walk-out periods by miners without certificates, as provided by the act of 1897. The bill is an amendment to this act and provides that "whenever the Governor of the Commonwealth shall by public proclamation declare that due to an insufficiency in the supply of coal an emergency exists which threatens the health and welfare of the people of the commonwealth the terms of this act of assembly shall thereupon be suspended for a period of three months from the date of such proclamation; and at the expiration of said period of three months this act shall again be in full force and effect unless the Governor shall issue a second proclamation under this act, in which case a like suspension of the act for a like period as before provided shall become effective."

It is further provided that "copies of all public proclamations issued by the Governor under the authority of this act shall be filed by the Governor in the offices of the Secretary of the Commonwealth and the Secretary of Mines."

T. E. Houston Dead

T. Edgar Houston, president and general manager of the Houston Coal Co., died at his home in Cincinnati, Ohio, March 26 after a long illness. Born in Christiana, Pa., 63 years ago, he moved to Virginia some years later and became chief clerk for the Norfolk & Western Ry. In 1889 he was made secretary-treasurer of the Houston Coal Co., organized by his father and an uncle. A year later he took over the management of the company.

The company acquired extensive holdings in West Virginia and Kentucky and in 1906 Mr. Houston opened headquarters in Cincinnati. In 1927 he disposed of eight mines in the Pocahontas fields to the Koppers Co., of Pittsburgh, Pa. He retained his holdings in the high-volatile fields of West Virginia and Kentucky.

To Form Hazard Coal Bureau

A coal trade bureau with a trade-practice code and statistical reporting is to be organized in the Hazard coal field of Kentucky in the near future. This was decided upon March 15 at a meeting of operators in that field held in Lexington, Ky., at the instance of the Hazard Coal Operators' Exchange, of which J. B. Hilton is president and J. E. Johnson is secretary.

Dock Men Seek to Simplify Sizing and Terminology

Dock operators will hold a general conference on the simplification of sizes and terminology of high-volatile bituminous coal at the St. Paul Hotel, St. Paul, Minn., April 10, under the auspices of the Division of Simplified Practices, Bureau of Standards, U. S. Department of Commerce. Action then will be taken on the recommendations made at a preliminary conference held in January. The recommendations to be considered are:

(1) The following sizes and terminology shall be standard for all high-volatile bituminous coal handled over the docks at the American head of the Great Lakes: Block, coal passing over a 4-in. screen; lump, over a 2-in. screen; egg, coal passing through a 2-in. screen; stove, coal passing through a 2-in. and over a 1¼-in. screen; nut and slack, coal passing through a 2-in. screen; screenings, coal passing through a 1¼-in. screen. The above-stated screen sizes refer to round holes.

(2) Bar screens having clear openings between bars as listed below shall be standard equivalents for round hole screens listed under (1): Bar screen with clear opening of 2⅝ in. shall be equivalent to a 4-in. round hole screen; 1½-in. opening to 2-in. round and ⅞-in. bar screen opening to 1¼-in. round hole.

(3) Slotted screen plates having clear widths at the smaller end of the slots as listed below shall be standard equivalents for round-hole screens listed under (1): Slot, 2⅝ in. at small end shall be equivalent to 4-in. round hole; 1½-in. slot to 2-in. round hole and ⅞-in. slot to 1¼-in. round hole.

It was the sense of the preliminary conference that the recommendations should apply primarily to the coal handled over the docks and distributed in Wisconsin, Michigan, Iowa, Minnesota, the Dakotas and Montana. It was also agreed that representatives of all major groups in the high-volatile trade and manufacturers of coal-handling and screening equipment should be invited to attend the conference.

Coal Men to Take Trial Trip On Powdered Coal Burner

Officials of the Inland Waterways Corporation, as the result of the interest that has been expressed in the new pulverized-fuel towboat that they are having built, have invited a party of fifteen coal men from Ohio, West Virginia, Kentucky, Illinois and Pennsylvania, to go on the trial trip of the vessel. H. L. Gandy, executive secretary of the National Coal Association, will accompany the party. The new towboat, which will be named the "Dwight W. Davis," is being built at the Charles Ward Engineering Works, Charleston, W. Va. It is expected that the trial run of the vessel will be made early in May.

The Shipping Board's fuel department has been so pleased with the results obtained with the "Mercer," a vessel of 9,730 tons that plans are under way for equipping other Shipping Board boats for the use of pulverized fuel. In making a survey of the situation the National Coal Association found that 1,000 plants are burning pulverized fuel under 2,000 boilers at the present time. During this survey it was found that some of the oil companies are using pulverized coal instead of fuel oil for power purposes at refineries. This is regarded as conclusive testimony as to the greater economy of coal. It is disclosed also that fifteen concerns are producing equipment to enable this type of fuel to be burned.

The National Coal Association attaches much significance to experiments that are being made to permit the use of pulverized coal for domestic heating purposes and in other cases where it is not practicable to install a unit pulverizer and burner. With the development of a practical system for transporting and storing such fuel the way will be opened for a broader market, it is stated.

N. & W. Opens Coal Bureau In Chicago

A coal bureau, to aid in the development of the business of producers in territory served by the Norfolk & Western Ry. and designed to render all possible aid to receivers and consumers of the product, was opened in Chicago on April 1 by the Norfolk and Western company. The bureau is located in the Marquette Building. D. J. Howe, chief clerk to the manager of the railroad's fuel department at Bluefield, W. Va., has been appointed district manager of the new bureau.

Start Move to Standardize Mine Cars and Timbers

The standards council of the American Standards Association at a meeting March 14 approved the recommendation of the mining standardization correlating committee, of which E. A. Holbrook is chairman, that a project be initiated covering the standardization of "design and materials of construction for coal-mine cars." Approval also was given to a recommendation that a series of projects for mine timbering be initiated.

These projects will cover specifications of grades, names and sizes of mine timbers, recommended practice for the storage of mine timbers and for their use. The American Mining Congress is sponsor for these projects.

New Mine Opened

Development work has been started by the Ingle Coal Co., Evansville, Ind., in preparation for the opening of a new mine near Littles, Pike County, Indiana. The Indiana Fifth Vein seam, averaging 6½ ft. in thickness and lying 90 ft. below the surface, will be reached by an 18-deg. slope.

An ultimate production of 1,200 tons per day is the goal of the company and the coal will be brought to the tipple by a belt conveyor. The mine is being developed as a unit using an Oldroyd cutting machine, a Joy loader and two battery locomotives. Four

sizes of coal will be marketed, shaker screens being employed to prepare it, and the three largest sizes are to be hand picked.

Personal Notes

ROBERT M. LAMBIE, chief of the Department of Mines of West Virginia, received a vote of confidence in a most practical manner March 8, when the House of Delegates, by unanimous vote, increased his salary from $6,000 to $7,000 per year.

C. C. MORFIT formerly secretary of the Tug River Coal Operators' Association, with headquarters at Welch, W. Va., has become a partner in the engineering firm of Stuart, James & Cooke, New York City.

D. E. ENGERSOLL has been appointed chief engineer of the Pennsylvania Coal Co.; W. J. Niemeyer, assistant chief engineer; C. W. F. Neuffer, consulting engineer; L. F. Sammer, division superintendent, northern division; Elkins Read, promoted from superintendent, No. 6 Colliery, Pittston, to district superintendent, southern division; William Muir, superintendent, No. 5 colliery, transferred to No. 6; J. P. Lafferty, made superintendent at No. 5.

JAMES J. MCANDREW, secretary-treasurer of District 9, United Mine Workers (in the anthracite region of Pennsylvania), has been elected president of the district to succeed Chris J. Golden, recently named secretary of the Anthracite Conciliation Board. Thomas R. Davis, Pottsville, was appointed to succeed Mr. McAndrew as secretary-treasurer.

R. H. SHERWOOD has been elected president and general manager of the Patoka Coal Co., Indianapolis, Ind., succeeding Jesse T. Moorman, who remains a stockholder. An expansion program adopted by the company includes the purchase of a $300,000 stripping shovel. Mr. Sherwood continues his active interest in and retains the presidency of the Central Indiana Coal Co. and is opening another property under the name of the Sherwood-Templeton Coal Co., with strip pits near those of the Central Indiana company.

C. A. WARDEN has been appointed by the Koppers Coal Co., Pittsburgh, Pa., as assistant general superintendent of the Houston operations at Kimball, W. Va. For a number of years Mr. Warden was connected in an official capacity with the Kingston Pocahontas Coal Co., operating mines in the Pocahontas and Tug River fields of West Virginia.

EDWARD B. LEISENRING and Ralph H. Knode, president, General Coal Co., were elected president pro tem. and executive vice-president, respectively, of the Westmoreland Coal Co. at a meeting of directors of that company held in Philadelphia, Pa., on March 19. These changes were made necessary by the recent death of S. Pemberton Hutchinson, president of the Westmoreland company.

Opportunities in Coal For the Engineer

The science of engineering has remade the world in the last century, according to Prof. A. C. Callen, head of the mining department, University of Illinois. The greatest era of progress was during the last 25 years, he said, but he foresees even greater strides during the next quarter century. Professor Callen's remarks were made March 13 at the Rialto Theater, Rock Springs, Wyo., where he spoke on the need of higher education with the idea of stimulating interest in the scholarship in mining engineering recently instituted by the Union Pacific Coal Co.

While coal mining has not advanced to the extent of other industries, declared Professor Callen, that fact assured the young man entering the field as a coal-mining engineer more opportunity than other fields of engineering. "The youth of today is standing on the threshold of a changing world," he said, "and the coal industry offers to him an opportunity for personal advancement and a life of service to his fellow men."

Coal and Coke Standards Tentatively Approved

The annual spring group meeting of committees of the American Society for Testing Materials was held at the Stevens Hotel, Chicago, March 19-22. In all, 25 committees of the society took part, holding sessions morning, afternoon and evening of each day, except on the 20th, when a dinner and entertainment was held in the evening.

The committee on coal and coke —D-5—of which A. C. Fieldner, chief engineer, experiment stations division, U. S. Bureau of Mines, is chairman, approved the following standards for recommendation to the society for advancement to standard: Method for determination of sulphur in coal and coke by bomb-washing and sodium-peroxide fusion methods; method of test for cubic foot weight of crushed bituminous coal; method of test for cubic foot weight of coke; method of test for sieve analysis of coke; method of tumbler test for coke.

Approval was given to the following for presentation to the society as tentative standards: Tentative method of test for sieve analysis of crushed bituminous coal and tentative method of test for size of anthracite.

Arrangements were made at the meeting for the continuation of co-operative sampling experiments to determine allowable tolerances when two or more samplers independently sample the same shipment of coal by the present A.S.T.M. standard method and by other methods involving the taking of smaller gross samples. From this data it is hoped to establish tolerances for different methods of sampling.

Following the meeting of Committee D-5 a meeting was held of the sub-committee on foundry coke specifications with a view to revising the present standard foundry coke specifications, which are old and require considerable revision to make them of value to consumers. The sub-committee decided to make a survey of desirable characteristics, both chemical and physical, which influence the performance of the coke in the cupola.

Considerable progress was reported in an investigation being conducted in the laboratory of the General Motors Corporation as to a method for the determination of combustibility of coke and its relation to the performance of the coke in the cupola.

Operators and Railway Men Foster Closer Relations

In line with its announced policy of fostering trade relations contacts, the National Coal Association has accepted an invitation of the International Railway Fuel Association to participate in a joint meeting to consider matters of mutual interest. The following committee has been appointed to confer with the railway fuel association: C. H. Jenkins (chairman), vice-president, Hutchinson Coal Co., Fairmont, W. Va.; D. H. Barger, president, Monarch Smokeless Coal Co., Shawsville, Va.; H. L. Findlay, vice-president, Youghiogheny & Ohio Coal Co., Cleveland, Ohio; L. C. Madeira, 3d, assistant to the president, Madeira, Hill & Co., Philadelphia; Pa.; Rice Miller, vice-president, Hillsboro Coal Co., Hillsboro, Ill., and H. A. Requa, vice-president, South Chicago Coal & Dock Co., Chicago.

The International Railway Fuel Association has named the following on its committee: C. H. Dyson, fuel agent, Baltimore & Ohio R.R. (chairman), Baltimore, Md.; C. H. Hoinville, fuel agent, Santa Fe R.R., Chicago; C. T. Winkless, fuel agent, C. R. I. & P. R.R., Chicago; T. Duff Smith, lake forwarding agent, C. N. Rys., Cleveland; Robert Collett, fuel agent, S. L. & S. F. Ry., St. Louis, Mo., and C. M. Butler, fuel agent, Atlantic Coast Line, Wilmington, N. C.

Organize Vancouver Company

Consumers' Coal Mines has been organized to take over and operate a coal property situated between Ladysmith and Nanaimo, on the east coast of Vancouver, British Columbia. The seam crops on Round Island, where a slope has been driven for 300 ft. A tipple and other plant requirements will be erected this spring and it is expected that the company will soon be producing 300 tons of coal per day. The seam is reported to have an average thickness of 8 ft.

Refuses to Suspend Cuts In Lake Cargo Rates

The Interstate Commerce Commission refused on April 6 to suspend tariffs filed by the Northern carriers reducing the rates on lake cargo coal 5c. per ton from the Fairmont district, 2c. from the Connellsville district, and 5c. from the central Pennsylvania district. These tariffs were protested by the Pittsburgh and Ohio coal operators and some of the Northern railroads. The reduced rates, therefore, became effective on the New York Central Lines as of April 1, and on other lines from these districts April 8.

West Virginia Safety Day To Be Observed Sept. 7

At a conference of mining and safety engineers with R. M. Lambie, chief of the State Department of Mines of West Virginia, Saturday, Sept. 7, was fixed as the date for the fourth annual state Safety Day celebration, which is to be held at Charleston. This year's celebration will differ from previous meets in that only teams which have met in district meets or in inter-company meets will be eligible to participate.

District tournaments or at least some of the district tournaments are scheduled to be held on the following dates: Williamson district, June 22, at Williamson; New River and Winding Gulf districts on July 4 at Mount Hope; Morgantown district, July 20, at Morgantown; Montgomery district at Montgomery on July 20; Jackson's Mill on Aug. 10; Logan district, at Logan on Aug. 17; Northern Panhandle district at Wheeling on Aug. 31 and Boone County district on Sept. 2 (Labor Day), at Madison.

To Organize Mine Officials

The Harlan County Coal Operators' Association decided at a meeting in March to form an association of superintendents and foremen from the various mines in order to discuss mining problems of mutual interest, safety measures and for the exchange of ideas. The work of the Southern Appalachian Efficiency Association, an auxiliary of the Southern Appalachian Coal Operators' Association, was cited as an example at the Harlan meeting. It was arranged to get in touch with operators in the Harlan field promptly and to hold a meeting early in April.

Votes to Curb Coal Police

The Industrial Police Bill, designed to curb alleged abuses by coal and iron police, was passed by the House at Harrisburg, Pa., April 4. The measure has been sent to the State Senator for consideration. Under the bill's provisions "industrial police" would take the place of the present coal and iron forces, and all other private police, except railroad police.

Their jurisdiction would be limited to within 300 ft. of company property. All such police would have to be residents of the state at least a year before their appointment by the Governor, and furnish a $2,000 bond.

Pittsburg & Midway Starts Big Shovel

Installation of the new 750 Bucyrus-Erie electric shovel at the No. 10 strip mine of the Pittsburg & Midway Coal Mining Co., Pittsburg, Kan., was recently completed and operation started. This machine is equipped with an 85-ft. boom, 60-ft. dipper sticks, 16-cu.yd. water-measure bucket and is mounted on caterpillars. The total weight of the machine, including 150 tons of ballast, is 1,005 tons and it is at present the largest stripping unit employed in the coal industry.

According to K. A. Spencer, in charge of engineering, Pittsburg & Midway company, a number of buckets of dirt have been measured and found to contain 22 cu.yd. when rounded up. He states that the use of two rotating motors has materially increased the speed or rotation, an average swing, after several hours of timing, requiring 39 seconds. From 50 seconds to 1½ minutes is required to move the machine up.

Alabama Coal Road Sold

A syndicate headed by W. H. Cloverdale, president of the Gulf States Steel Corporation, and W. W. Colpitts, consulting engineer, of New York, has bought the Tennessee, Alabama & Georgia R.R. The road operates between Gadsden, Ala., and Chattanooga, Tenn. Its route is through the Lookout Mountain coal field. A report is current that connection with the Seaboard Air Line at Margaret, Ala., through an extension is contemplated.

King Coal's Calendar for March

March 1—Options on the properties of about twenty large Indiana coal companies to be included in a proposed merger extended for 60 days; taken in some quarters as an indication that the scheme will go through.

March 1—Delaware charter granted Amalgamated Coal Corporation, with authorized capital of $50,000,000 and proposed issue of $15,000,000 in bonds, organized to stabilize soft-coal industry through formation of large units, improved production methods, elimination of duplication in selling efforts and laboratory study to produce byproducts economically.

March 4—Cage falls in coal mine near Artemovsk, in Donetz Basin, Russia, killing 27 miners of 29 in descending cage.

March 5—Holding that issues involved are moot, U. S. Supreme Court refuses to pass on controversy over powers of Interstate Commerce Commission in stipulating rates on coal consigned for lake cargo shipment. Decree of District Court of Southern West Virginia enjoining Commerce Commission's denial of permission to Southern railroads to reduce rates 20c. on shipments to the lakes following similar action by Northern carriers reversed and the bill dismissed.

March 5—Jones bill providing for repeal of anthracite tax reported out favorably by House committee of Pennsylvania Legislature.

March 5—Issuance of $30,800,000 of 20-year convertible 6 per cent debenture bonds proposed by Philadelphia & Reading Coal & Iron Co., the proceeds to be used for construction of two modern, electrically operated centralized breakers, electrification of equipment and for retirement of $9,950,000 notes payable. Stockholders ratify proposal on March 16.

March 6—Consolidation Coal Co. starts improvements at Owings mine, Shinnston, W. Va., to cost $75,000 to $100,000. Mechanical loaders and cutters and other modern equipment will be installed.

March 9—Northern Colorado coal miners petition State Industrial Commission for increase in wages and better working conditions. The petitioners notified the commission that if their request was not complied with they reserved the right "to take such action as they deemed necessary."

March 9—Committee of large and small coal producers to curtail "no bill" evil in coal shipments named by National Coal Association.

March 12—Plans discussed to form Anthracite Club in New York. Producers, distributors and makers of burning equipment participate in preliminary meeting to launch organization designed to co-ordinate efforts to promote use of anthracite.

March 14—Condition of bituminous coal industry in Pennsylvania is "admittedly serious," according to report by Walter H. Glasgow, Secretary of the State Department of Mines. "Until overdevelopment is checked and the supply made to fit the demand there can be no permanent relief," he declared.

March 15—Daniel T. Pierce, vice-chairman, Anthracite Operators' Conference, says producers have unanimously agreed to reduce mine price of anthracite if bill repealing hard-coal tax is passed.

March 18—Eight miners lose lives in fire at Coombs Wood colliery, Worcestershire, England.

March 19—Bill presented in Pennsylvania Legislature proposes gradual repeal of anthracite tonnage tax. Would cut impost from 1½ to 1 per cent June 1 next; to 0.5 per cent June 1, 1930, and abolish tax entirely one year after that date.

March 21—Explosion at Kinloch mine of Valley Camp Coal Co., Parnassus, Pa., results in death of 46 men. Two hundred and thirty-four escaped from the mine in safety.

March 21—Car ferry starts from Conneaut, Ohio, with 28 cars of coal on first trip of season for Port Stanley, Ontario, getting away three weeks ahead of schedule.

March 21—Chris. J. Golden, former president of District 9, United Mine Workers, elected secretary of the Anthracite Conciliation Board to succeed James A. Gorman, who was chosen umpire some months ago.

Death Rate From Mine Accidents Higher in February

ACCIDENTS in the coal mines in the United States in February, 1929, caused the death of 171 men, according to reports received from state mine inspectors by the U. S. Bureau of Mines. Production of coal for the month was 53,941,000 tons, of which 47,271,000 tons was bituminous and 6,670,000 tons anthracite. Of the 171 fatalities reported, 129 were in bituminous mines in various states and 42 in the anthracite mines of Pennsylvania. Fatality rates per million tons based on these figures were 2.73 and 6.30, respectively, for bituminous and anthracite mines, while the industry as a whole showed a death rate of 3.17.

The record for February, 1928, showed 166 fatalities, 130 of which occurred in bituminous mines and 36 in anthracite mines; 46,933,000 tons of coal was produced, 41,351,000 tons of which was bituminous and 5,582,000 tons anthracite. The corresponding fatality rates per million tons produced were 3.14 for bituminous, 6.45 for anthracite and 3.54 for the total. January, 1929, showed rates slightly lower for both bituminous and anthracite mines and also for the industry as a whole.

Reports for the first two months of 1929 show that accidents at coal mines caused the loss of 347 lives. The production of coal during this period was 112,734,000 tons with a death rate of 3.08 as compared with 3.45 for the same two months of 1928, based on 334 deaths and 96,831,000 tons of coal. Divided into bituminous and anthracite the fatality rates for 1929 were 2.68, based on 265 deaths, and 98,727,000 tons; and 5.85, based on 82 deaths and 14,007,000 tons, respectively. The figures for these two months in 1928 showed 270 fatalities, 85,559,000 tons of coal and a death rate of 3.16 for bituminous; 64 deaths, 11,272,000 tons of coal and a rate of 5.68 for anthracite; and a total fatality rate of 3.45 based on 334 deaths and 96,831,000 tons of coal produced.

The month of February, 1929, was free from major disasters—that is, accidents in which 5 or more lives were lost. One such disaster occurred in January, 1929, causing the loss of 14 lives, and based exclusively on this figure the death rate for the two months was 0.124 as compared with 0.475 for the first two months of 1928, based on 46 deaths in three major disasters.

Figures for the first two months of 1929 when compared with those for the same period a year ago show a reduction in the death rate for falls of roof and coal, gas and dust explosions, and electricity, while a slight increase is noted for haulage and explosives.

	Year 1928	Jan.-Feb. 1928	Jan.-Feb. 1929
All causes	3.812	3.449	3.078
Falls of roof and coal	1.868	1.787	1.552
Haulage	0.632	0.527	0.692
Gas or dust explosions:			
Local explosions	0.088	0.072	0.116
Major explosions	0.572	0.475	0.124
Explosives	0.130	0.103	0.186
Electricity	0.155	0.093	0.089
Other causes	0.367	0.392	0.319

Mine Safety Appliances Wins Rice Trophy

The Cecil G. Rice Safety Trophy was awarded to the Mine Safety Appliances Co., Pittsburgh, Pa., at the annual banquet of the safety school conducted by the Western Pennsylvania Safety Council, held at Syria Mosque, Pittsburgh, March 11. The banquet was attended by more than 1,800 men and women from industrial plants in the Pittsburgh district who had completed the safety lecture course.

The Cecil G. Rice trophy is awarded annually to the company in the western Pennsylvania district which has attained the best safety record for the preceding year and therefore is much sought after by all member companies of the National Safety Council. Its achievement in capturing the award was especially gratifying to the Mine Safety Appliance Co., as it is dedicated to safety, being engaged entirely in the manufacture of safety appliances.

There is considerable hazard involved in the company's work as it has to do largely with providing protection against poisonous and explosive gases. The employees are continually working with these gases and many of them are engaged in the dangerous work of rescue and recovery after mine explosions and mine fires.

Coal-Mine Fatalities During February, 1929, by Causes and States

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

State	Underground												Shaft					Surface							Total by States	
	Falls of roof (coal rock, etc.)	Falls of face or pillar coal	Mine cars and locomotives	Explosions of Gas or Coal Dust	Explosives	Suffocation from mine gases	Electricity	Animals	Mining Machines	Mine fires (burned suffocated, etc.)	Other causes	Total	Falling down shafts or slopes	Objects falling down shafts or slopes	Cage, skip or bucket	Other causes	Total	Mine cars and mine locomotives	Electricity	Machinery	Boiler explosions or bursting steam pipes	Railway cars and locomotives	Other causes	Total	1929	1928
Alabama	2	....	2	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	....	....	4	6
Alaska	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Arkansas	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	13
Colorado	4	2	1	....	....	....	....	....	....	....	....	7	....	....	....	....	....	....	....	....	....	....	....	....	7	8
Illinois	2	....	2	....	4	....	....	....	1	....	1	10	1	....	....	....	1	....	....	....	....	....	....	1	1	11	9
Indiana	....	....	1	....	....	....	1	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1
Iowa	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1
Kansas	1	....	1	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	2	0
Kentucky	7	....	6	....	....	....	1	....	....	....	....	14	....	....	....	....	....	....	....	....	....	....	....	....	....	14	8
Maryland	1	....	1	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	2	0
Michigan	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Missouri	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	2
Montana	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	1
New Mexico	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	3
North Dakota	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Ohio	4	....	4	....	....	....	....	....	....	....	....	8	....	....	....	....	....	....	....	....	....	....	....	....	....	8	5
Oklahoma	2	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	2	3
Pennsylvania (bituminous)	13	4	6	....	....	....	....	....	....	....	1	24	1	....	....	....	1	2	1	....	....	....	....	3	....	28	33
Tennessee	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	6
Texas	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	0
Utah	3	....	1	1	....	....	....	....	....	....	....	5	....	....	....	....	....	....	....	....	....	....	....	....	....	5	2
Virginia	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	2
Washington	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	3
West Virginia	17	2	6	3	1	....	1	....	....	....	....	30	....	....	....	....	....	....	....	....	....	....	....	3	3	33	24
Wyoming	2	....	2	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	....	....	....	4	0
Total (bituminous)	60	8	35	4	7	....	3	....	1	....	2	120	2	....	....	....	2	2	1	....	....	....	....	4	7	129	130
Pennsylvania (anthracite)	17	3	9	1	5	....	....	....	....	....	2	37	....	1	1	....	2	1	....	....	....	....	1	1	3	42	36
Total, February, 1929	77	11	44	5	12	....	3	....	1	....	4	157	2	1	1	....	4	3	1	....	....	....	1	5	10	171	....
Total, February, 1928	71	10	28	29	6	....	3	....	2	....	7	156	....	1	2	....	3	4	....	1	....	....	1	1	7	....	166

Among the Manufacturers

A. W. French & Co., Chicago, have been merged with the Blaw-Knox Co. and subsidiary companies, Pittsburgh, Pa.

* * *

The New Departure Mfg. Co., Bristol, Conn., plans a large factory extension program that will add 250,000 sq.ft. of floor space to its main works at Bristol and 80,000 sq.ft. to the Meriden plant.

* * *

The Baldwin Locomotive Works, Philadelphia, Pa., has purchased a substantial interest in the business of the Geo. D. Whitcomb Co., Rochelle, Ill., and will sell the products of the latter company through its representatives abroad as well as in the railway field in this country.

* * *

The firm of Schlangen Bros. Co., Chicago, has changed its name to the Schlangen Mfg. Co.

* * *

The American Brass Co., manufacturing subsidiary of the Anaconda Copper Mining Co., has acquired the French Manufacturing Co., Waterbury, Conn.

* * *

Meco, Inc., is the new name of the American branch of the Mining Engineering Co., Ltd., Worcester, England. Clarence R. Claghorn, 700 Continental Building, Baltimore, Md., is president of the American branch, which is under the same management and ownership as before.

* * *

The Corken Pump & Machinery Co., Oklahoma City and Tulsa, Okla., has been appointed representative in the Oklahoma district for the Dayton-Dowd Co., Quincy, Ill.

* * *

W. J. Miller, formerly president of the Northwestern Steel & Iron Co., Minneapolis, Minn., has been appointed vice-president of Foote Bros. Gear & Machine Co., Chicago, in direct charge of the manufacturing and sales of the new road machinery division.

* * *

In view of the withdrawal of Erle S. Ormsby from the Ormsby-Rassieur Mine Equipment Co., St Louis, Mo., it has been deemed advisable to change the name of the company to Central Mine Equipment Co. The offices have been removed to the Railway Exchange Building.

P. S. Jones has been appointed manager of the New York district office of Cutler-Hammer, Inc., Mr. Jones, who formerly was manager of the Pittsburgh office, succeeds C. W. Yerger, who has left the company to accept a position with the Hanson-Van Winkle-Munning Co., Matawan, N. J. T. S. Towle, formerly a sales engineer of the Pittsburg office, becomes manager at Pittsburgh. G. E. Hunt has charge of distributors' sales.

* * *

The thirty-ninth acetylene gas plant of the Prest-O-Lite chain, located at 925 Hughes Street, Houston, Texas, has started operations. A. J. Harrower is superintendent of the new plant and H. F. Sautter, whose headquarters are at the Dallas plant, is district superintendent.

* * *

The Roller-Smith Co., 233 Broadway, New York City, announces these additions to its sales organization: Jackson Brown, Jr., 701 Kittridge Building, Denver, Colo., is representative in Colorado, Utah, Wyoming and northern New Mexico, and the Manila Machinery & Supply Co., Inc., Manila, covers the Philippine Islands.

* * *

Conrad G. High, who for the past ten years has been associated with the Penn Planing Mill Co., Reading, Pa., has been appointed to the sales staff of the Reading Iron Co.'s Reading district office. A. C. Knight, formerly of the Oversole Rubber Corporation, New York City, has been added to the selling staff of the New York office.

* * *

M F. Behar has been appointed advertising manager of the Quigley Furnace Specialties Co., New York City.

* * *

Ohio Brass Co., Mansfield, Ohio, has opened its new office at 2143 Railway Exchange Building, 611 Olive Street, St. Louis, Mo. This office will be the headquarters of H. W. Kilkenny, district sales manager for the company in the St. Louis territory.

* * *

The Salt Lake Inter-Mountain office of the Sullivan Machinery Co. opened a branch and warehouse at Price, Utah, April 1. A full stock of coal-mining machine repair parts and supplies, as well as other Sullivan equipment will be maintained.

The Bucyrus-Erie Co., announces the removal of its Chicago district office to 105 West Adams Street.

* * *

James S. Watson has been elected vice-president of the Link-Belt Co., Chicago. His headquarters will be at the Dodge works, Indianapolis, Ind.

* * *

The Wagner Electric Corporation, St. Louis, Mo., announces the addition of K. G. Baker to the Cincinnati (Ohio) sales force.

* * *

Henry W. Armstrong has been elected treasurer of the Joseph Dixon Crucible Co., Jersey City, N. J., vice William Koester, deceased. Mr. Armstrong entered the employ of the Dixon company in 1903 as office boy.

* * *

The Dry Quenching Equipment Corporation, New York City, a subsidiary of International Combustion Engineering Corporation, will begin construction in conjunction with Stevens & Wood, Inc., engineers and constructors, at the Court Street plant of the Consumers Power Company, Flint, Mich., of a dry quenching plant to care for approximately 280 tons of coke per day. This installation will provide approximately 280,000 lb. of high-pressure steam daily from heat now wasted through wet quenching, a better grade of domestic coke, reduced maintenance charges and will eliminate cold weather freezing difficulties.

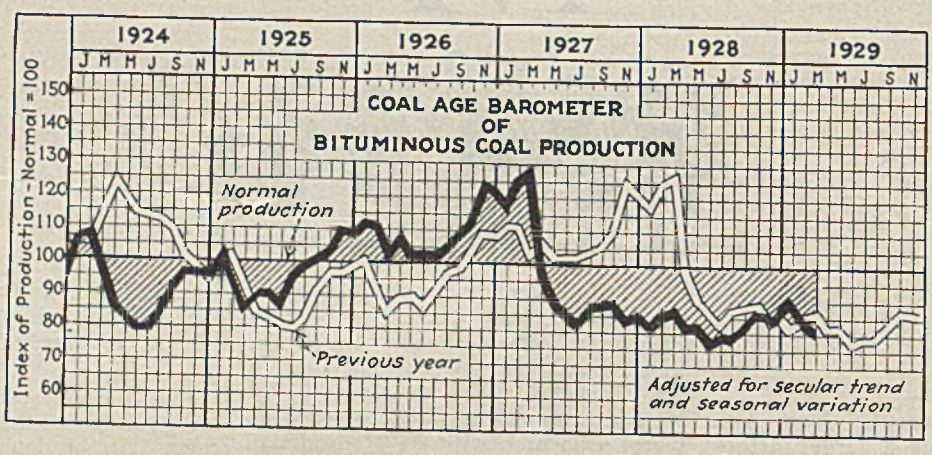
* * *

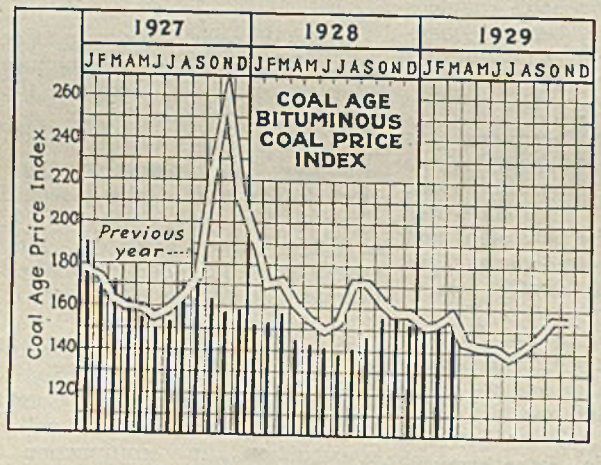
S K F Industries Inc., 40 East 34th St., New York City., announces that its Buffalo office has moved from 517 Manufacturers and Traders Building to Main and Genesee Sts., the Detroit office from 6520 Cass Ave. to 2820 East Grand Boulevard, and the San Francisco office from 115 New Montgomery St. to 221 Eleventh St. The personnel of the various offices remains the same.

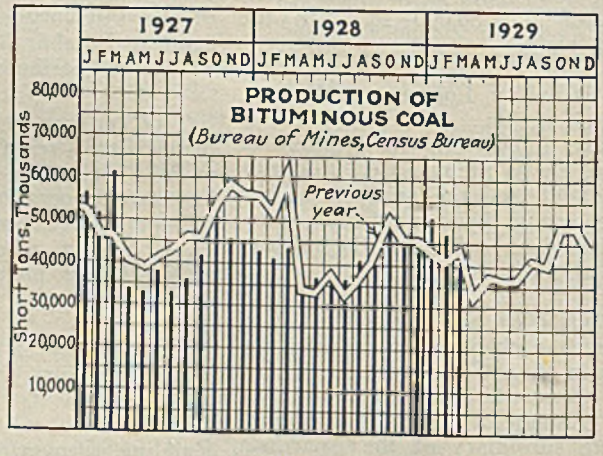
* * *

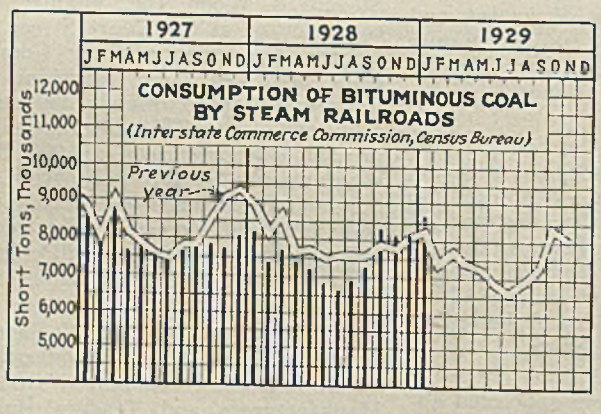
R. L. Sittinger, 80 Federal Street, Boston, Mass., has been appointed New England representative for the Northern Equipment Co., Erie, Pa. He succeeds Harry H. Leathers, who will devote his entire time to his other business interests. Peacock Brothers, Ltd., Montreal, have been appointed representatives for the Toronto territory.

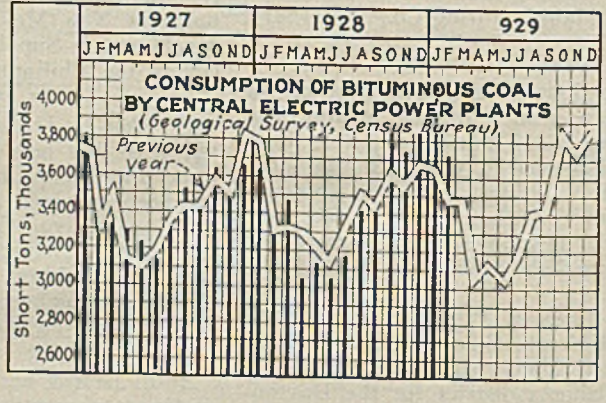
Indicators of Activities in the Coal Industry

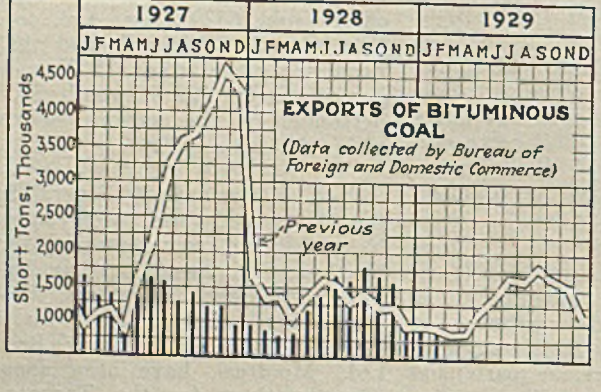


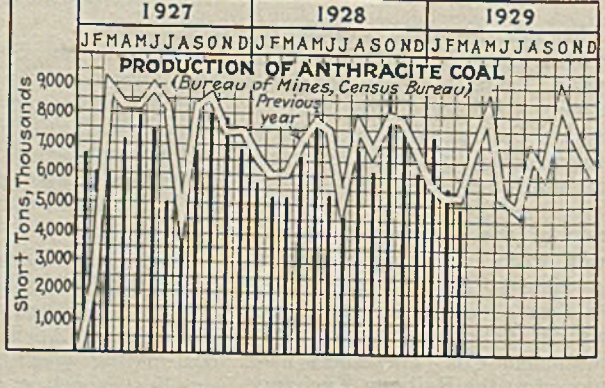












MARKETS *in Review*

BITUMINOUS coal markets of the United States faced business contions largely dependent on the uncertainties of weather conditions during March. In this instance the month which is noted for its vagaries failed to show much of its lion-like disposition, and as a consequence there were few developments that brought cheer to the coal producer. Shortly after the expiration of the first week there was a fairly general rise in temperature throughout the country, which not only caused a marked decline in demand for domestic sizes but was productive of a large number of cancellations of orders already placed. The outstanding development in an otherwise colorless situation was issuance of spring price schedules, the quotations in some instances showing radical reductions. As the new prices were not to become effective until April 1, however, this action had no stimulus on demand.

Steam coals suffered from the lack of consumer interest that characterizes the interlude between winter's close and the opening of a new coal year. There was some closing of contracts it is true, but not in sufficient volume to put real life in the market. Screenings as well as mine-run show a firmer price tendency, due more to reduced output of prepered sizes than to buying activity. The early break of winter's grip has intensified interest in the opening of navigation on the lakes. Shipments to the lower ports, in fact, have already started.

Bituminous production last month, according to preliminary estimates of the U. S. Bureau of Mines, was 39,210,000 net tons, compared with the revised total for February of 47,271,000 tons. The average output per working day fell from 1,974,000 to 1,508,000 tons. In March a year ago 43,955,000 tons was produced, or a daily average of 1,628,000 tons.

Coal Age Index (preliminary) of spot bitumionus prices in March was 150, compared with the revised February figures of 152¾. By weeks the figures for March were: 154, March 2; 152, March 9; 150, March 16; 148, March 23, and 146, March 30. The corresponding weighted average prices were $1.87, $1.84, $1.82, $1.79 and $1.77. Revised figures for February were 153, Feb. 2, and 154, Feb. 9, 16 and 23. The corresponding weighted average prices were $1.85, $1.87, $1.87 and $1.86.

In the anthracite trade the announcement of spring prices by the companies was of unusual interest as the cut this year was 60c. on domestic sizes and 20c. to 50c. on steam coals, in addition to an allowance of 2 per cent discount for payment of bills within ten days or 1 per cent for settlement within 10 to 30 days. The movement of tonnage was only fair, with the weather the governing factor. Chestnut and egg moved well, pea showed improvement, while stove lost ground. The steam sizes were somewhat stronger. March output of anthracite was 4,950,000 net tons and the daily average was 190,000 tons, compared with the revised figure of 6,670,000 tons in the preceding month and 5,497,000 tons a year ago.

THE only feature of interest in a conspicuously dull market at Chicago was the announcement of radical price reductions on domestic sizes effective April 1. Both prepared and steam coals from all fields were stagnant. Southern Illinois producers cut lump and egg 75c. a ton, whereas advances were made on steam sizes. The new quotations are: Lump and egg, $2.25; stove and nut, $2.40; chestnut and pea, $2.15; mine-run, $2.15; screenings, $1.65@$1.75. Western Kentucky lump and egg were cut from $2 to $1.50@$1.65; screenings were advanced from 50@60c. to 85c.@$1. Indiana No. 4 lump and egg at $2.25@$2.55 and screenings at $1.35@$1.60 compared with former figures of $2.50@$3.25 and $1.10@$1.50, respectively.

Adjustments on smokeless coals provoked surprise in that the price set by Pocahontas producers for mine-run was $2, but New River operators stuck to the March contract figure of $2.25. April prices on lump and egg are $2.75@$3; stove, $2.50@$2.75; nut, $2.25@$2.50; pea, $2. The usual spring cut of 50c. on domestic sizes of anthracite was made and coke made in Chicago was reduced $1.50 on lump, egg and range, and $1 on pea.

AN ELEMENT of depression in the domestic situation is the fact that the retail trade in Chicago has changed the opening date of its coal year to May 1, but the weather has been warm and yard stocks are large since the dealers stocked heavily before the break in the weather. The steam-coal problem is a puzzle to Midwestern producers because consumers are buying lightly despite the tightness of tonnage. Inquiries are increasing, however. Contracting showed improvement in southern Illinois, but was negligible in Indiana and western Kentucky.

Tonnage of both steam and domestic grades moved well in the St. Louis territory during the first half of the month, bringing to a virtual close one of the best coal seasons the district has seen in the last eleven years. There was a pronounced falling off in the latter part of the month, when prices broke and

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

		Week Ended						
		March 2, 1929		March 9, 1929	March 16, 1929	March 23, 1929	March 30, 1929	
	Market Quoted	Independent	Company	Independent	Independent	Independent	Independent	Company
Broken	New York		$8.25@$8.50					$8.25@$8.50
Broken	Philadelphia	$8.50@$8.75	8.25	$8.50@$8.75	$8.50@$8.75	$8.50@$8.75	$8.50@$8.75	8.25
Egg	New York	8.35@ 8.75	8.75	8.35@ 8.75	8.30@ 8.75	8.25@ 8.75	7.90@ 8.75	8.75
Egg	Philadelphia	8.75@ 9.00	8.75	8.75@ 8.75	8.75@ 9.00	8.75@ 9.00	8.75@ 9.00	8.75
Egg	Chicago*	7.82	7.82	7.82	7.82	7.82	7.82	7.82
Stove	New York	8.85@ 9.25	9.25	8.85@ 9.25	8.80@ 9.25	8.75@ 9.25	8.40@ 9.25	9.25
Stove	Philadelphia	9.10@ 9.35	9.10	9.10@ 9.35	9.10@ 9.35	9.10@ 9.35	9.10@ 9.35	9.10
Stove	Chicago*	8.26	8.26	8.26	8.26	8.26	8.26	8.26
Chestnut	New York	8.50@ 8.75	8.75	8.50@ 8.75	8.35@ 8.75	8.25@ 8.75	7.90@ 8.75	8.75
Chestnut	Philadelphia	8.75@ 9.00	8.75	8.75@ 9.00	8.75@ 9.00	8.75@ 9.00	8.75@ 9.00	8.75
Chestnut	Chicago*	7.82	7.82	7.82	7.82	7.82	7.82	7.82
Pea	New York	4.40@ 5.00	5.00	4.40@ 5.00	4.40@ 5.00	4.40@ 5.00	4.25@ 5.00	5.00
Pea	Philadelphia	5.00@ 5.25	5.00	5.00@ 5.25	5.00@ 5.25	5.00@ 5.25	5.00@ 5.25	5.00
Pea	Chicago*	4.45	4.45	4.45	4.45	4.45	4.45	4.45
Buckwheat	New York	2.60@ 3.25	†3.00@ 3.25	2.75@ 3.25	2.75@ 3.25	2.50@ 3.25	2.50@ 3.25	†3.00@ 3.25
Buckwheat	Philadelphia	3.00@ 3.25	3.00	3.00@ 3.25	3.00@ 3.25	3.00@ 3.25	3.00@ 3.25	3.00
Rice	New York	1.60@ 2.00	2.25	1.60@ 2.00	1.60@ 2.00	1.35@ 1.75	1.35@ 1.75	2.25
Rice	Philadelphia	2.25@ 2.50	2.25	2.25@ 2.50	2.25@ 2.50	2.25@ 2.50	2.25@ 2.50	2.25
Barley	New York	1.35@ 1.70	1.70@ 1.75	1.35@ 1.70	1.35@ 1.70	1.40@ 1.70	1.40@ 1.70	1.70@ 1.75
Barley	Philadelphia	1.75@ 2.00	1.75	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75

*Net tons, f.o.b. mines. †Domestic buckwheat, $3.75 (D., L. & W.)

western Kentucky developments upset conditions in the Illinois mining fields. When Franklin County prices broke there was a slump in activity in the Mt. Olive and Standard fields as well as in such intermediate fields as Duquoin, Centralia and others. Railroad buying was lighter with fuel oil in oversupply and industrials were not stocking steam coal; in fact demand on all grades flopped.

Steam-coal consumers were liberal buyers at the Duluth and Superior docks during the first two weeks of March. Thereafter springlike weather set in, and there was a sharp decline in shipments of all grades. Screenings are weak, particularly smokeless, due to the steady demand hitherto for prepared sizes. Shipments off the docks in March are estimated at 20,000 cars, compared with the February record total of 31,290 cars. It is a fact, however, that nearly all steam consumers as well as retailers are well stocked for the time being.

THE dock operators are optimistic on the outlook for the new coal year as industrial conditions are promising and the practice of making price concessions to obtain contracts seems to have been abandoned permanently. Coal stocks on the docks had fallen on March 31 to approximately 3,800,000 tons of bituminous and 375,000 tons of anthracite, and a further substantial reduction is expected before new shipments start to arrive from the lower lake ports.

In the Southwest demand fell off sharply during the first week of March and there are accumulations of "no bills" at most of the mines despite curtailment of production. All Spadra (Ark.) anthracite mines and most of the Kansas deep-shaft operations are closed, except for a few working on railroad contracts, the others in this district running only one or two days a week. Prices were nominally unchanged for the month, but a readjustment of mine quotations for the summer storage movement is to be announced in April.

Severe weather continued during March in Colorado and New Mexico, which was reflected in gratifying business for the coal producers. The mines operated practically full time and tonnage moved promptly. Only on screened sizes have "no bills" begun to appear. Coal production in Colorado in February was 1,155,810 tons, as against 848,318 tons a year ago. March mine quotations were: Walsenburg-Canon City lump, $5.75; washed chestnut, $4.75; fancy chestnut, $3.25; Trinidad coking lump, $3.75; lump-and-nut, $3.50; fancy chestnut, $3.25; Crested Butte large anthracite, $9.50; brooder mixture, $7.25; chestnut, $5; Rock Springs-Kemmerer lump, $4.50; nut, $3.75; steam coal, $1.35.

The late winter period of activity in the Kentucky coal trade struck some snags in the last fortnight of March. Heavy rains and resultant floods in the eastern and southeastern portions of the state curtailed production considerably late in the third week of the month, and this was followed by unusually warm weather. Prepared sizes were hard to move and screenings were in poor supply, some buyers it is said, being forced to take mine-run. "No bills" of prepared sizes increased rapidly in both the eastern and western mining fields. A number of mines have closed and others are running on greatly curtailed schedules. The opening of lake navigation is awaited with considerable interest; meantime a number of large railroad and industrial contracts are pending.

PRICES on prepared grades have slumped badly with the waning demand, and unpleasant possibilities are seen if screenings and mine-run show signs of strength. Spot prices in eastern Kentucky at the month end were: block, $1.75@$2.25; lump and egg, $1.50@$1.75; mine-run, $1.35@$1.60; screenings, 75c.@$1.25. Western Kentucky quotations were: block, $1.50@$1.65; lump and egg, $1.25@$1.50; nut, $1@$1.20; mine-run, $1@$1.25; screenings, 75c.@85c.

The seasonal turn in the flow of the Cincinnati trade came in mid-March. The price break and cancellations had been discounted in advance, however, and there was no great surprise. Producers south of the Ohio did much to steady the market by curtailing production; late in the month less than 10,000 cars per week were coming through the gateway, compared with over 13,000 during the first week. Readjustments are still going on.

MUCH of the reduction in tonnage was in prepared sizes, and though there was a clutter of screenings in freight reservoirs and side lines, curtailment of output caused these to be cleaned up quickly, so that whereas the residue went begging early in the month at 30c.@40c. it had topped 75c. at the month end. Smokeless screenings by this time were as high as $1.25 and there was liberal buying of smokeless lump and egg at the new spring circular of $2.75@$3. On the high-volatile list egg was hardest hit: for several weeks it was a glut on the market and much of it went at mine-run prices. Movement to the lakes has begun, but the tonnage contracted for and prices obtained are under cover.

The appearance of warm weather early in the month was responsible for a featureless month in the Columbus trade. Domestic demand fell to a minimum, many orders were cancelled and "no bills" increased. Screenings showed renewed strength toward the month end, due to reduced production of lump. There was some interest in contracts at this time, but not to the extent shown in the past, as many large consumers are signing up for only a portion of their requirements, with the intention of filling the remainder through bargain hunting. Ohio operators are hopeful of cutting in on a share of the lake business.

Prices eased off during the latter part of the month, with quotations on contracts showing a considerable spread. Hocking and Pomeroy producers continued to ask $2 for 4-in. lump and $1.75 for 2x4 in., as for the last few months. Retail prices remained fairly firm until near the month end, when there was some shading.

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

LOW-VOLATILE, EASTERN	Market Quoted	Week Ended Mar. 2, 1929	Mar. 9, 1929	Mar. 16, 1929	Mar. 23, 1929	Mar. 30, 1929
Smokeless lump	Columbus	$3.00@$3.25	$3.00@$3.25	$3.00@$3.25	$3.00@$3.25	$3.00@$3.25
Smokeless mine-run	Columbus	1.75@ 2.10	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 1.95
Smokeless screenings	Columbus	.75@ 1.10	.85@ 1.10	.85@ 1.10	1.00@ 1.20	1.10@ 1.35
Smokeless lump	Chicago	3.00@ 3.50	3.00@ 3.50	2.50@ 3.50	2.25@ 3.25	2.25@ 3.00
Smokeless mine-run	Chicago	2.00@ 2.25	2.00@ 2.25	1.75@ 2.25	1.75@ 2.25	1.65@ 2.25
Smokeless lump	Cincinnati	3.00@ 3.50	3.00@ 3.50	2.75@ 3.25	2.50@ 3.00	2.50@ 3.00
Smokeless mine-run	Cincinnati	2.25	2.10@ 2.25	2.00@ 2.25	1.85@ 2.25	1.85@ 2.00
Smokeless screenings	Cincinnati	.60@ 1.25	.75@ 1.15	.75@ 1.00	.75@ 1.00	.75@ 1.00
*Smokeless mine-run	Boston	4.35@ 4.50	4.40@ 4.50	4.35@ 4.50	4.30@ 4.40	4.15@ 4.35
Clearfield mine-run	Boston	1.65@ 1.85	1.65@ 1.85	1.60@ 1.85	1.60@ 1.85	1.60@ 1.85
Cambria mine-run	Boston	1.75@ 2.10	1.75@ 2.10	1.75@ 2.10	1.75@ 2.10	1.75@ 2.10
Somerset mine-run	Boston	1.70@ 2.00	1.70@ 2.00	1.70@ 2.00	1.70@ 2.00	1.70@ 2.00
Pool 1 (Navy Standard)	New York	2.35@ 2.60	2.25@ 2.65	2.25@ 2.65	2.20@ 2.55	2.20@ 2.55
Pool 1 (Navy Standard)	Philadelphia	2.30@ 2.65	2.30@ 2.65	2.30@ 2.65	2.30@ 2.65	2.30@ 2.65
Pool 9 (super. low vol.)	New York	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.70@ 1.95	1.70@ 1.95
Pool 9 (super. low vol.)	Philadelphia	1.80@ 2.15	1.80@ 2.15	1.80@ 2.15	1.80@ 2.15	1.80@ 2.15
Pool 10 (h. gr. low vol.)	New York	1.65@ 1.80	1.65@ 1.80	1.65@ 1.80	1.45@ 1.60	1.45@ 1.60
Pool 10 (h. gr. low vol.)	Philadelphia	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80
Pool 11 (low vol.)	New York	1.50@ 1.60	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50
Pool 11 (low vol.)	Philadelphia	1.40@ 1.65	1.40@ 1.65	1.40@ 1.65	1.40@ 1.65	1.40@ 1.65
HIGH-VOLATILE, EASTERN						
Pool 54-64 (gas and st.)	New York	$1.25@$1.40	$1.25@$1.40	$1.25@$1.40	$1.25@$1.40	$1.25@$1.40
Pool 54-64 (gas and st.)	Philadelphia	1.25@ 1.40	1.25@ 1.40	1.25@ 1.40	1.25@ 1.40	1.25@ 1.40
Pittsburgh sc'd gas	Pittsburgh	1.90@ 2.00	1.90@ 2.00	1.90@ 2.00	1.90@ 2.00	1.90@ 2.10
Pittsburgh gas mine-run	Pittsburgh	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.80
Pittsburgh mine-run	Pittsburgh	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75
Pittsburgh slack	Pittsburgh	.80@ 1.00	.90@ 1.00	1.00@ 1.10	1.00@ 1.15	1.00@ 1.20
Kanawha lump	Columbus	1.75@ 2.10	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Kanawha mine-run	Columbus	1.25@ 1.55	1.25@ 1.55	1.25@ 1.55	1.25@ 1.50	1.25@ 1.50
Kanawha screenings	Columbus	.50@ .75	.60@ .85	.65@ .85	.75@ .90	1.00@ 1.25
W. Va. lump	Cincinnati	2.00@ 3.00	1.75@ 2.75	1.65@ 2.50	1.65@ 2.25	1.75@ 2.25
W. Va. gas mine-run	Cincinnati	1.35@ 1.60	1.35@ 1.60	1.30@ 1.65	1.35@ 1.60	1.40@ 1.60
W. Va. steam mine-run	Cincinnati	1.15@ 1.40	1.00@ 1.35	1.10@ 1.35	1.15@ 1.35	1.15@ 1.35
W. Va. screenings	Cincinnati	.30@ 1.00	.50@ 1.00	.50@ 1.00	.40@ 1.00	.75@ 1.00
Hocking lump	Columbus	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Hocking mine-run	Columbus	1.35@ 1.60	1.25@ 1.55	1.25@ 1.55	1.25@ 1.55	1.25@ 1.55
Hocking screenings	Columbus	.75@ .90	.85@ 1.10	.85@ 1.00	.90@ 1.10	1.00@ 1.35

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

At Pittsburgh the demand for domestic lump fell off to almost nothing, with the result that prices show a softer tendency. While industrial buying has not been heavy with the approach of the new coal year the price of gas lump as well as of slack became stronger as the month advanced. Steam slack at the month end was 80c.@90c. During the later weeks production was at about 60 per cent with the trend downward. There is more uncertainty than usual as to the trend of output with lake navigation about to open and the rate situation still unsettled. The season will open with a 35c. differential in favor of the Pittsburgh district, but with one railroad urging a bigger spread there is likely to be some hesitancy on the part of buyers.

The trade in the central Pennsylvania region pursued the even tenor of its way during the first three weeks of March, when there was a perceptible weakening in demand and production. Prices remained relatively firm, however, at levels prevailing in recent months.

IN New England the market for steam coal was dull and heavy. At all the terminals, including the Hampton Roads piers, tonnage accumulated, with the result that prices slipped; f.o.b. vessel at Norfolk and Newport News the preferred grades of smokeless run-of-mine sold off late in March until $4.35 per gross ton was the month-end maximum. Second grades could be had spot at $4.15, with variations 5c. either way. It was another instance where output got somewhat out of hand, and until there is drastic curtailment the trade sees no prospect of a higher price level. Stoker coal also was under the pressure of excess supply, sales having been made at $3.80 per gross ton f.o.b. vessel.

Quotations on cars Boston also receded until $5.50@$5.60 was the top price for No. 1 run-of-mine and $5@$5.10 was the range for the best grade smokeless nut-and-slack. At Providence spot prices have been even lower; $4.85 on cars was touched as the month closed for high-grade low-volatile nut-and-slack. Fuel oil has again made its influence felt on the wholesale market in Providence. Very low prices are quoted, and already it is understood several manufacturing plants have changed from coal to oil because of the long term of low price inducements offered.

Contract making occupied most of the attention of the New York trade during March. While users were slow in agreeing to terms, which in most instances were said to be 15c. below last year's prices, it is thought that the tonnage tied up will compare favorably with that of the closing coal year. Spot demand was slow at all times, buyers taking only current requirements. The situation is encouraging, however, as producers feel that there will be a heavy movement of tonnage later to replenish depleted stockpiles. Prices remain low and uninteresting to the producer.

A SEASONAL lull hit the Philadelphia market in March, yet demand was better than a year ago. Coal stocks at industrial plants are rather low, which is responsible for a fair current rate of demand. By the same token the outlook for contracting shows promise; many concerns, however, continue to supply a portion of their needs in the open market. The industrial outlook is good, particularly in the steel and building trades. There was a noticeable improvement in slack with the cement industry gaining headway. All in all, the best demand has been for high quality low-volatile fuels.

The extreme dullness that has featured the commercial coal market at Birmingham was unrelieved throughout March. Industrial consumption failed to show any improvement and new business as well as shipments against contracts was limited to current requirements. A heavy tonnage of coking coals, however, moved to byproduct ovens, which operated on practically a capacity basis. Quotations were unchanged.

Absence of cold weather put the quietus on the domestic trade too, so that retailers ordered sparingly, preferring to trim stocks on hand. Even the spring price schedules, which went into effect March 19, failed to stimulate buying interest, though in some instances the figures are lower than in previous years. Indications point to a fair volume being placed on contracts, however. Latest mine quotations are: Cahaba lump and egg, $3.25@$3.50; Black Creek lump, $3.50; egg, $3.25@$3.35; nut, $2.75; Carbon Hill lump and egg, $2.25; Big Seam lump, egg and nut, $1.75; Corona lump and egg, $2.50; nut, $2.35; Montevallo-Aldrich lump and egg, $4.75; Montevallo-Straven lump, $4; egg, $3.75; Piper and Coleanor lump, $4.

THE movement of anthracite in the New York market during March was fair. Chestnut appeared to lead in demand and there was a good call for egg. Stove, however, fell behind. Pea, which moved slowly all winter, gained strength as spring approached. The steam sizes were in good demand, No. 1 buckwheat showing notable gains in the last fortnight. Dealers, who delayed buying pending announcements of spring mine prices, were surprised at the cut of 60c. on domestic and of 20c. to 50c. on steam grades, effective April 1. Advances of 10c. per month will begin May 1. Discounts by the producers at the rate of 2 per cent for payment within 10 days and of 1 per cent within 10 to 30 days also were an agreeable surprise.

March was a disappointing month to the trade in Philadelphia; unusually mild weather was the depressing factor. As a result the mines were able to work only about half time throughout the month and much of the tonnage produced accumulated in cars during the later weeks. Despite careful buying by dealers, however, the month end found them with unusually large yard stocks. Spring reductions in mine prices on domestic sizes, effective April 1, were 60c. per gross ton, the cut also applying to pea coal.

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

		Week Ended				
MIDDLE WEST	Market Quoted	Mar. 2, 1929	Mar. 9, 1929	Mar. 16, 1929	Mar. 23, 1929	Mar. 30, 1929
Franklin, Ill. lump	Chicago	$2.85@$3.00	$2.85@$3.00	$2.85@$3.00	$2.85@$3.00	$2.85
Franklin, Ill. mine-run	Chicago	2.15@ 2.25	2.15@ 2.25	2.15@ 2.25	2.15@ 2.25	2.15
Franklin, Ill. screenings	Chicago	1.25@ 1.60	1.25@ 1.60	1.40@ 1.60	1.50@ 1.60	1.65@ 1.75
Central, Ill. lump	Chicago	2.40@ 2.65	2.40@ 2.65	2.40@ 2.65	2.40@ 2.65	2.40@ 2.65
Central, Ill. mine-run	Chicago	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Central, Ill. screenings	Chicago	.90@ 1.25	.90@ 1.25	1.00@ 1.25	1.10@ 1.25	1.35@ 1.40
Ind. 4th Vein lump	Chicago	2.50@ 3.25	2.50@ 3.25	2.50@ 3.25	2.50@ 3.25	2.25@ 2.55
Ind. 4th Vein mine-run	Chicago	1.50@ 2.25	1.50@ 2.25	1.50@ 2.25	1.50@ 2.25	1.50@ 2.25
Ind. 4th Vein screenings	Chicago	1.20@ 1.60	1.20@ 1.60	1.20@ 1.60	1.20@ 1.60	1.20@ 1.60
Ind. 5th Vein lump	Chicago	2.25@ 2.60	2.25@ 2.60	2.25@ 2.60	2.25@ 2.60	2.00@ 2.25
Ind. 5th Vein mine-run	Chicago	1.25@ 1.90	1.25@ 1.90	1.25@ 1.90	1.25@ 1.90	1.25@ 1.90
Ind. 5th Vein screenings	Chicago	.85@ 1.10	.85@ 1.10	.85@ 1.10	.85@ 1.15	1.10@ 1.25
Mount Olive lump	St. Louis	2.35	2.35	2.35	2.25	2.25
Mount Olive mine-run	St. Louis	2.00	2.00	2.00	2.00	2.00
Mount Olive screenings	St. Louis	1.25@ 1.35	1.25@ 1.35	1.35	1.60@ 1.75	1.60@ 1.75
Standard lump	St. Louis	2.00@ 2.15	2.00@ 2.15	2.00@ 2.10	2.00@ 2.10	2.00
Standard mine-run	St. Louis	.80@ 1.85	1.75	1.75	1.75	1.75
Standard screenings	St. Louis	.40@ .50	.55@ .60	.70@ .80	.80@ .85	.90
West Ky. block	Louisville	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.60@ 1.85	1.50@ 1.65
West Ky. mine-run	Louisville	.90@ 1.25	.90@ 1.20	.90@ 1.20	.90@ 1.25	1.00@ 1.25
West Ky. screenings	Louisville	.45@ .85	.55@ .75	.55@ .75	.55@ .75	.75@ .85
West Ky. block	Chicago	2.00@ 2.25	2.00@ 2.25	1.85@ 2.00	1.65@ 1.75	1.50@ 1.65
West Ky. mine-run	Chicago	2.00@ 1.40	1.00@ 1.40	1.00@ 1.40	.85@ 1.25	.95@ 1.25
SOUTH AND SOUTHWEST						
Big Seam lump	Birmingham	$1.75@$2.00	$1.75@$2.00	$1.75@$2.00	$1.75@$2.00	$1.75@$2.00
Big Seam mine-run	Birmingham	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50
Big Seam (washed)	Birmingham	1.50@ 2.00	1.50@ 2.00	1.50@ 2.00	1.50@ 2.00	1.50@ 2.00
S. E. Ky. block	Chicago	2.50@ 3.00	2.50@ 3.00	2.50@ 3.00	2.00@ 2.25	2.00@ 2.25
S. E. Ky. mine-run	Chicago	1.40@ 1.65	1.40@ 1.65	1.40@ 1.65	1.35@ 1.65	1.35@ 1.65
S. E. Ky. block	Louisville	2.25@ 2.75	2.25@ 2.75	2.00@ 2.50	1.75@ 2.25	1.75@ 2.25
S. E. Ky. mine-run	Louisville	1.35@ 1.70	1.30@ 1.70	1.30@ 1.70	1.20@ 1.65	1.35@ 1.60
S. E. Ky. screenings	Louisville	.45@ 1.00	.45@ .90	.45@ .90	.60@ 1.10	.75@ 1.25
S. E. Ky. block	Cincinnati	2.25@ 3.00	2.00@ 3.00	1.75@ 2.50	1.85@ 2.25	1.85@ 2.25
S. E. Ky. mine-run	Cincinnati	1.15@ 1.60	1.00@ 1.60	1.10@ 1.60	1.15@ 1.65	1.15@ 1.65
S. E. Ky. screenings	Cincinnati	.30@ 1.00	.40@ 1.00	.50@ 1.00	.50@ 1.00	.75@ 1.00
Kansas shaft lump	Kansas City	3.50@ 4.50	3.50@ 4.50	3.50@ 4.50	3.50@ 4.50	3.50@ 4.50
Kansas strip lump	Kansas City	3.00@ 3.25	3.00@ 3.25	3.00@ 3.25	3.00@ 3.25	3.00@ 3.25
Kansas mine-run	Kansas City	2.75	2.75	2.75	2.75	2.75
Kansas screenings	Kansas City	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75

WHAT'S NEW

In Coal-Mining Equipment

Oval Tube Air Heaters Are Economical

An advanced type of heat exchanger, known as the Shaw-Perkins oval tube air heater, is now being marketed by the Shaw-Perkins Manufacturing Co., Pittsburgh, Pa. It recovers, according to the manufacturers, the heat ordinarily lost in boiler-stack gases and returns it to the furnace in the preheated combustion air. Among the advantages claimed are low draft loss and high heat recovery, easy removal of the heating elements or of soot collections and flexible air-tight header construction. The equipment may be obtained in 40 standard sizes of heating elements.

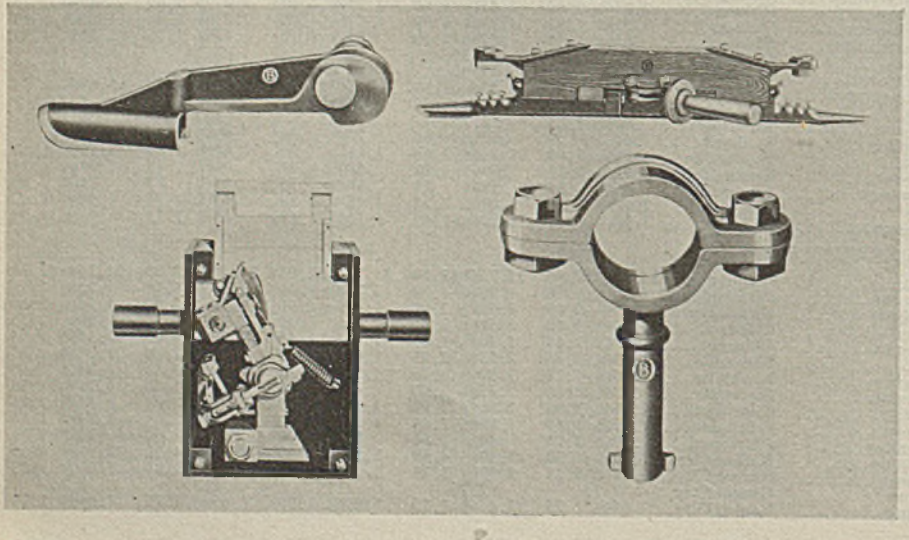
Trolley Operation Aided By New Products

Four new products have been recently added to the line of trolley accessories of the Ohio Brass Co., Mansfield, Ohio. One of these is a 2½-in. bronze cam tip for 6-0 round and grooved trolley wire. It is said to afford an easily renewable approach for malleable iron frogs and crossovers. The type M-3 mine section insulator switch for sectionalizing trolley circuits is now being made to take the 6-0 round or grooved trolley.

The pipe suspension type of "Security" mine feeder wire insulator used for supporting and insulating feeder wires can now be obtained for use with 1¼-in. pipe in addition to that for 1½-in. pipe, the only type previously manufactured.

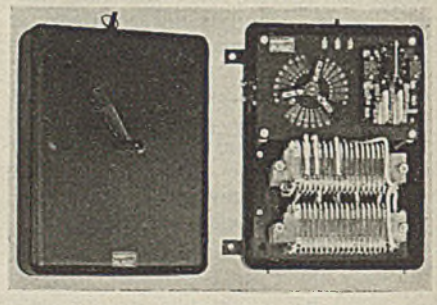
Supplementing the above additions, the Ohio Brass Co. offers a 1,200-amp. automatic circuit breaker for sectionalizing mine trolley and power circuits. This breaker is shown in the accompanying illustration with the cover removed. While the continuous rating of this breaker is 1,200, the company asserts that it can be adjusted to take care of momentary peak loads of 1,500 amp. As it is manually operated, its stays out after opening until the trouble has been eliminated, thus affording protection against fire from a grounded trolley or feeder wire. The breaker and hand operated knife switch are interlocked, compelling proper sequence of operation. Arcing tips, arc shute, blow-out coil and vent extinguish the arc without destructive burning.

Recently developed Trolley Accessories



Speed Controller for Fans and Blowers

The General Electric Co. announces the development of a new speed controller for slipring induction motors, primarily intended for the control of motors driving ventilating fans in buildings. This new device, bearing the designation CR-7765-B-1, has the primary magnetic switch, dial-type controller and speed-regulating resistance mounted in a sheet-steel inclosing case.



Speed Controller, Cover Removed

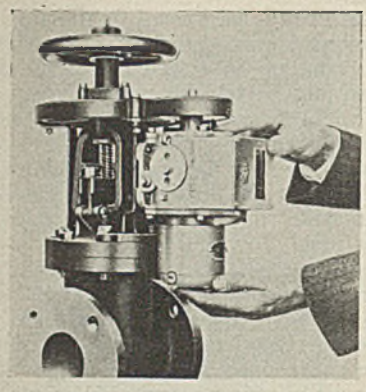
Applications of the new controller will be to motors driving ventilating fans, blowers and other machines where the amount of torque required decreases as the speed is reduced. The controllers provide overload and undervoltage protection, and will give approximately 50 per cent speed reduction by inserting resistance in the motor circuit.

Locomotive Type Cranes Gasoline Powered

A complete new line of locomotive cranes for gasoline, Diesel or electric motor drive, to be known as the "L" type cranes, is being marketed by the Link-Belt Co., Chicago. According to the company, these are not merely modified steam cranes but are designed throughout for the entirely different and much more severe conditions imposed by a power unit running continuously at full operating speed. This machine may be obtained in five sizes ranging from ¾ to 2 cu.yd. capacity and is equipped with a two-speed travel gear for fast and slow traveling.

Motor-Driven Mechanism Operates Valves

Automatic operation of all valves up to 6 in. is now possible with the new motor-driven valve operating unit manufactured by the Cutler-Hammer Mfg. Co., Milwaukee, Wis. This equipment may be operated automatically by means of float switches, temperature-controlling devices, pressure regulators or conveniently located push buttons, according to the manufacturer. While designed primarily for valve-operating service in industries where regulation of pressures and temperatures of gases and fluids is



Valve Operating Unit

necessary it also is adapted to miscellaneous applications, such as operating skylights, awnings, radiators or garage doors.

Furnace Equipment Cools or Heats

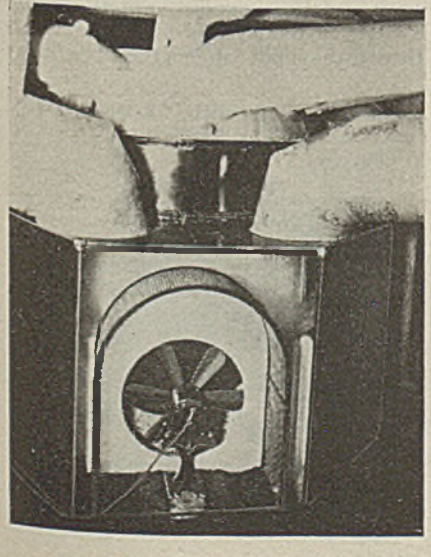
Mechanical cooling of homes in summer is possible through the development, by the Holland Furnace Co., Holland, Mich., of a motor-fan unit installed in an improved warm air heating plant. This new unit makes it possible to keep air circulation going during the summer months.

The essential new features are a ⅛-hp. motor, a six-blade fan of 3,500 c.f.m. capacity, a plenum chamber, an air filter and a system of valves. Motor control is exercised by a switch placed beside the draft control. Operation of the unit increases the air velocity with resultant rapid heating, improved circulation and more uniform temperatures. Longer ducts may be used, more stories and a greater number of rooms may be heated without difficulty.

Summer operation results in a marked cooling effect. This comes from the passage of the air over the cool furnace, mixture of the different air layers in the rooms and rapid circulation. Uniform humidity also may be obtained by use of a new humidifier, and as the air is drawn through the furnace it is constantly sterilized, resulting in healthier conditions.

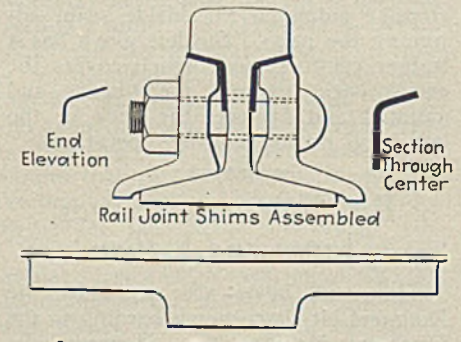
A similar fan unit has been devised for furnaces already in use.

Furnace for Cooling or Heating



Tapered Shims Proposed For Worn Joints

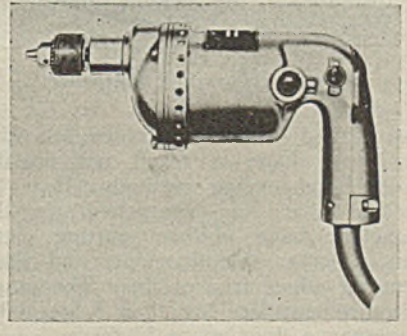
Wear on the fishing surface of angle bars and rails is greatest at the center of rail joints where rail ends meet, according to the American Fork & Hoe Co., Cleveland, Ohio. To meet this condition and eliminate low joints this company markets a tapered shim, shown in the accompanying illustration. It is designed to replace the metal worn away and thereby extend the life of the angle bar, reduce track maintenance, take up wear, relieve inward bend, prevent freezing and hold the joint tight.



Construction Details, Tapered Shim

Light-Duty Electric Drill

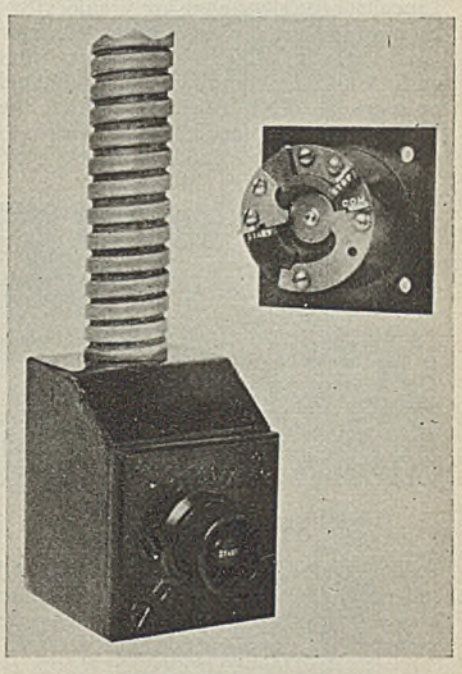
While not intended for continuous production, the ¼-in. light-duty electric drill now being manufactured by the Van Dorn Electric Tool Co., Cleveland, Ohio, is a strong, serviceable tool for intermittent use. According to the makers, its lightness and compactness make it the ideal drill for the tool kit and the handle design and reduced length render it especially useful in close corners. It is equipped with a universal motor operating on either direct or alternating current, hardened alloy steel gears, chuck, cable and attachment plug.



Showing Drill Appearance

Embody Safety Features In Push Button

Some unusual features have been incorporated in the safety push button recently announced by the Lincoln Electric Co., Cleveland, Ohio. The "start" button (with a ball top) is contained inside a large "stop" button which protects it from accidental contact. The colors of the two buttons are in accordance with standard signal colors, the "start" button being green and the surrounding "stop" button red. Another feature claimed by the makers is ease of installation.



Views of Button

Efficient Retort Stokers Now Offered

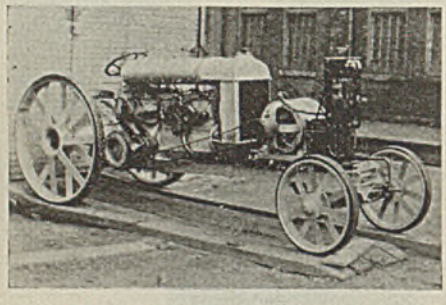
The larger sizes of multiple-retort stokers manufactured by the Combustion Engineering Corporation, New York City, have been entirely redesigned, according to a recent announcement. Practically the entire grate area is active and parts subject to wear and burning can be easily replaced. The design of the ram box allows the retort to be proportioned to the length of the stoker, with improved operation and efficiency.

Auxiliary rams are a decided departure from former construction, according to the manufacturer, and the grate bars have a variable travel and move in sections. Each retort is built up to provide for expansion and minimize the possibility of cracking. Ashpits may be supplied with either grinder rolls or dump grates. Zone control of air pressure is afforded by use of separate air compartments extending across the width of the stoker and the entire stoker body subjected to heat is free to expand without disturbance of the front wall.

This stoker is recommended for burning all grades of coking bituminous coal and may be applied to large as well as medium or small units.

Portable Arc Welder Saves Time

A new mounting of the standard Lincoln Electric stable arc welders has been announced by the Pontiac Tractor Co., Pontiac, Mich. The welder unit with "stablizer" and panel is mounted on a frame which attaches to either the McCormick-Deering 10/20 or Fordson tractor. The mounting of the arc



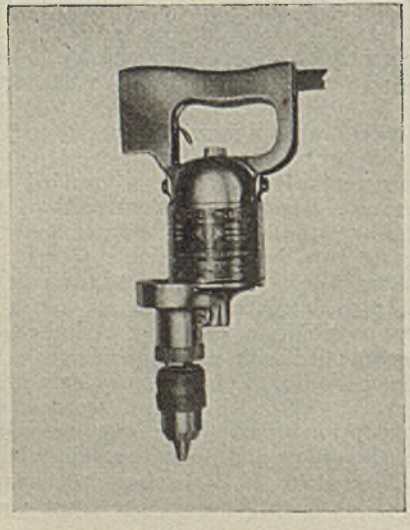
Self-Propelled Welding Outfit

welder gives a four-wheel rubber tired self-propelled unit capable of hauling heavy loads. The unit also may be mounted on crawlers for soft ground.

Drill Also Is Adapted to Buffing and Grinding

Not only drilling but odd jobs of buffing and grinding may be done with new $\frac{3}{8}$-in. "Wodack" portable electric drill, made by the Wodack Electric Tool Corporation, Chicago, Ill. This tool weighs $7\frac{1}{2}$ lb. and, according to the manufacturers, is a general-purpose tool. It is powered with a G.E. motor of the latest variable speed type, controlled by a trigger switch.

Drill Adopted to Buffing and Grinding



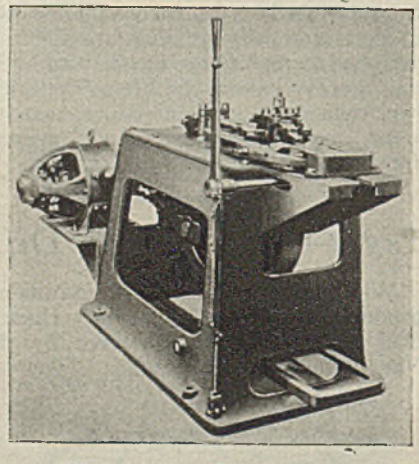
Gloves and Blowpipe Aid Welding

Welding gloves and the Oxweld type W-15 aircraft welding blowpipe are among the new products announced by the Oxweld Acetylene Co., New York City. The blowpipe is designed especially for aircraft fuselage welding and is extremely light, weighing only 9 oz. with the largest tip attached.

Soft and pliable leather, according to the Oxweld company, has been used in the gauntlet-type gloves. These are specially treated to protect them against heat and are reinforced by a leather strip on the thumb seam and a semi-circular patch on the inside seam adjoining the palm. The left glove has a leather reinforcement which covers the entire back between the fingers and gauntlet and protects the back of the left hand during cutting operations.

Bit Sharpener Saves Time and Labor

Time and labor are saved by the Diamond bit sharpener according to the Diamond Machine Co., Monongahela, Pa., the manufacturers. It is so designed that it simulates hand forging and at the



View of New Bit Sharpener

same time produces machine bits of a uniform shape—a result not possible with hand-forging methods. It is asserted that bits sharpened on this machine have uniform cutting clearance, dense, smooth points and sharp cutting edges free of fins. The power requirements are less than 5 hp. and it occupies a floor space 33x69 in.

Explosive Gas Detector

The Union Carbide Sales Co., New York City, will presently place on the market a portable instrument that detects immediately the presence of a wide range of combustible gases or vapors and indicates whether or not the atmosphere containing these gases is safe to breathe and safe for flames or fire. It will be known as the U. C. C. combustible gas indicator. The indicator is made up of a detector head, meter case and portable battery.

Some of the important advantages claimed for the indicator are as follows: Sampling and laboratory analyses are eliminated; indications are immediate; explosive mixtures are indicated by continual oscillation of the meter needle; guesswork is eliminated by direct, accurate readings; continuous observations may be made while men are working in gaseous atmospheres; the entire outfit is safe to operate in all gas-air mixtures except those containing acetylene or hydrogen and the apparatus is self-contained. It will operate satisfactorily and safely in explosive mixtures of methane and similar gases and in the presence of inflammable vapors, including those of gasoline and alcohol.

Motor-Drive Undercutter Has Advantages

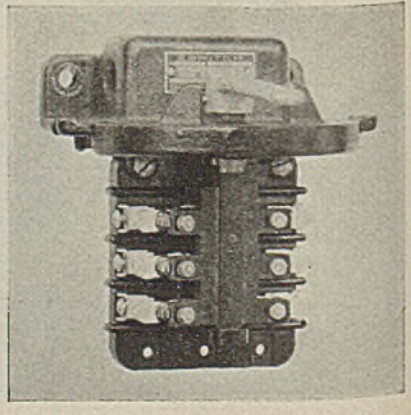
A number of advantages are claimed for the new "Ideal" commutator mica undercutter (motor-driven) produced by the Ideal Commutator Dresser Co., Sycamore, Ill. According to the makers, this equipment can be operated in a space $3\frac{1}{2}$ in. wide and saves the time spent in dismantling brushes, brush boxes, rigging, etc., and the time spent in reassembling. Greater efficiency in setting and locking the adjustable-depth gage and the roller guide also is claimed.

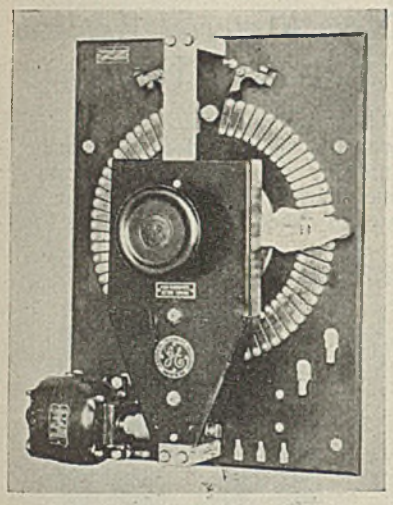
Efficiency Is Objective Of Electrical Aids

Among the new electrical products announced by the General Electric Co. are a number of switches of various types, a new electric strip heater, two types of compensators, a temperature relay and a magnetic control unit for induction motors on oil-well drills of the rotary type.

Included in the new switches offered is a small, inexpensive, oil-immersed switch, CR-2960-SY-105, for use in throwing small alternating- or direct-

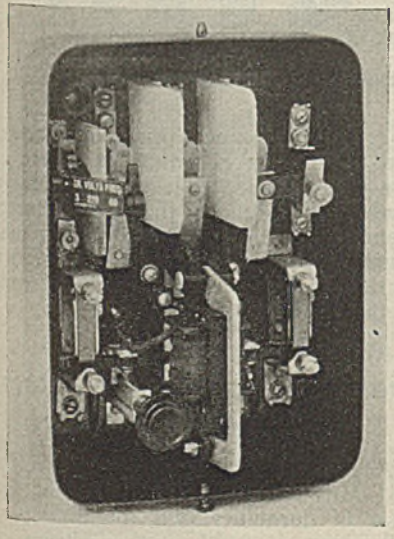
Oil-Immersed Switch, CR-2960-SY-105





CR-8490-B1 Motor-Operated, Renewable-Segment Radial Switch

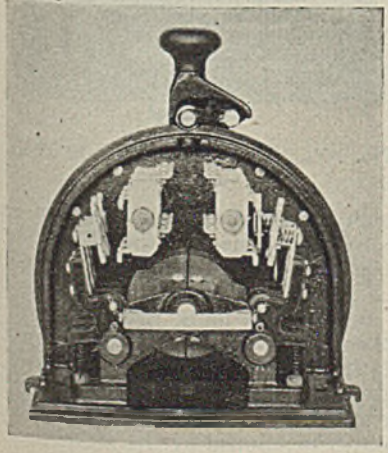
current motors across the line. Simplicity and a minimum of parts are features of the equipment and the ad-



Three-Pole Magnetic Switch, CR-7006-D-26-A

vantages claimed for it are: Double-break, separately insulated contacts, free from shunts or drum fingers; molded insulation; simple and adequate means

Three-Point Reversing Master Switch, C-3614



for mounting and conduit connections and small, compact design with oil-immersed features.

The radial switches offered are of the rheostat type for varying the fields of large electric machines and possess the outstanding advantage, according to the company, of renewable segments. These switches are for general application where the current is between 50 and 300 amp., and may be obtained for hand, sprocket, gear, solenoid and motor operation. These bear the designations CR-8090, CR-8190, CR-8290, CR-8390 and CR-8490, respectively.

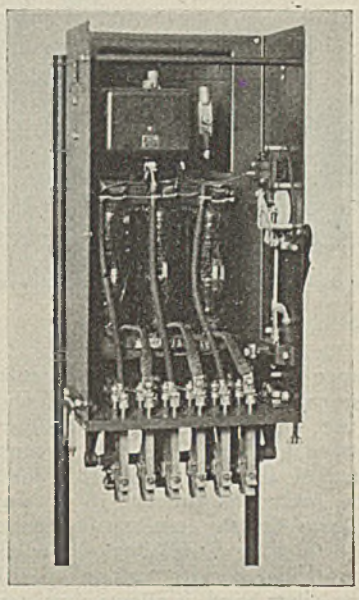
For general-purpose starters for small a.c. motors the addition of two new switches, designated as the CR-7006-D-26-A and the CR-7006-D-26-D, round out the general line. The first is a standard design of three- and four-pole magnetic switch with "start" and "stop" stations and is recommended for starting and protecting small a.c. motors that can be thrown directly on the line where it is desired to locate the switch at the driven machine. The CR-7006-D-26-D type switch is for similar service but it especially designed, according to the manufacturer, to provide plenty of wiring space and to be used with remote push-button stations.

A wide range of applications is claimed for the new line of cam-operated double-break master and limit switches. The master switches, shown in the accompanying illustration, bear the designations C-3614 and C-3616, and the limit switches, LS-429. Both are expected to be of especial value in the steel industry and on such applications as skip hoists, car dumpers and other machines requiring geared-type switches.

High interrupting capacity is claimed for the recently developed manual starting compensator, type CR-1034-K-33. It is especially applicable, according to the manufacturer, to the control of high-speed squirrel-cage motors, including all two- and most four-pole types, particularly where high-inertia loads require high inrush currents and considerable time to get up to speed. For such applications the high capacity of the contact mechanism of this compensator is expected to be of special value.

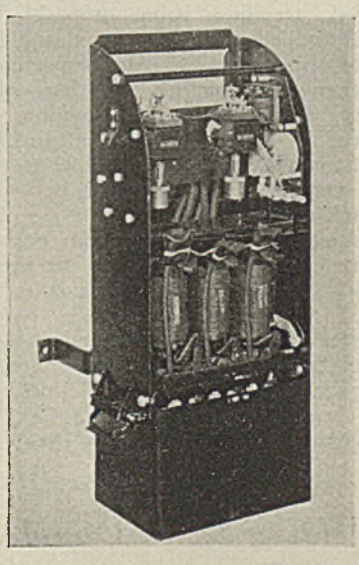
For operation in gaseous atmospheres, the company has designed a hand starting compensator, CR-1034-N-52, so modified from the standard equipment as to eliminate exposed arcing. The starting switch is oil-immersed and a standard time-delay undervoltage attachment and dashpot relays with Cooper-Hewitt mercury tubes are substituted for the usual contact tips of the dashpot relays. This equipment is available for 25 to 60 cycle, two- or three-phase motors of 15 hp. or less at 110 volts and 125 hp. or less at 220, 440 and 550 volts.

A complete control equipment, bearing the designation CR-7876, has been especially designed for the heavy-duty requirements of the rotary method of drilling oil wells. This development is



Hand-Operated Compensator, Cover and Oil Tank Removed

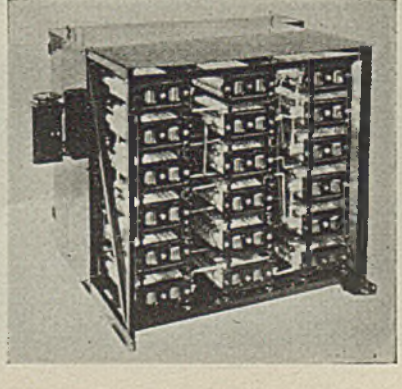
necessary, it is asserted, because of the greater depth of drilling and heavier duty resulting from modern rotary

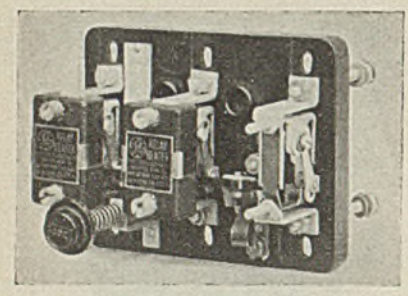


Size 2 Hand Compensator, CR-1034-N-52

practice. The apparatus consists of a primary and secondary magnetic panel, special resistor, fused safety inclosed

Magnetic Control Unit for Rotary Drills, Back View





Temperature Relay

entrance switch, master switch, current transformer and ammeter. It is designed for use on 150-hp. 440-volt slip-ring induction motors. The most important feature of the new control, according to the maker, is the use of automatic time delay during acceleration, preventing the driller from abruptly opening the controller to the "full-on" position. On the other hand, it allows consistently rapid acceleration.

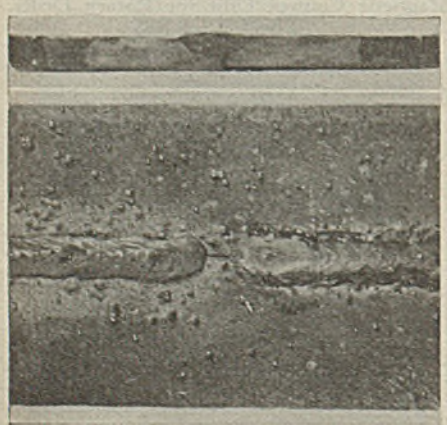
Double- and triple-pole temperature overload relays, which allow the user to remove and insert new heating elements when necessary or the use of a third relay unit on the same base if desired, are now being offered. The line is divided into two parts, designated as TC-121 and TC-131, respectively, the former protecting two legs of a circuit and the latter providing an element for the protection of a third leg. Both forms are rated from 30 to 150 amp. and are available for either front or back connecting.

An electric strip heater can now be obtained for use either as an air heater or as a "clamp-on" device. It is designed for general purposes where electric heat is required, and is suggested for use in cabs, valve houses, pump houses, water baths, oil lines, etc. The heater, which measures 24x1¼x⅜ in., is rated at 500 watts at 110 or 220 volts.

Welding Speed Doubled

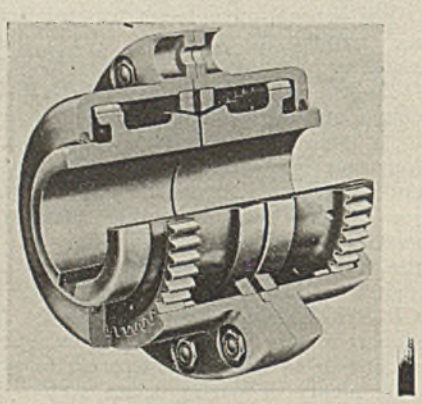
Elimination of porosity, smooth bead finish and greater ductility of the weld are advantages claimed for "Fleet-Weld," a new welding rod perfected by the Lincoln Electric Co., Cleveland, Ohio. It is claimed that in recent tests the welding speed was doubled or trebled, this increase in welding speed being reflected in lower costs to the user.

As the Weld Appears



Flexible Coupling Has Many Advantages

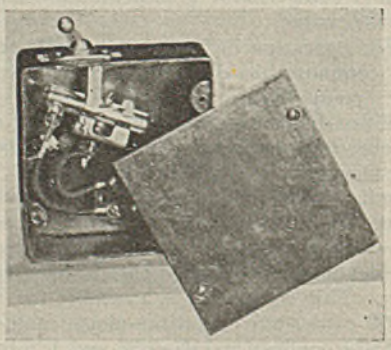
Self-lubrication and alignment at any point are advantages claimed for the new flexible couplings of the Poole Engineering & Machine Co., Baltimore, Md. According to the makers, the design is simple, there being no springs, bushings, pins, laminations or other wearing points. The gear teeth have spherically formed crowns on each hub and support the floating sleeve while allowing free rocking action to compensate for misalignment of the shaft.



Construction Details, Flexible Coupling

Mercury Toggle Switch Promotes Safety

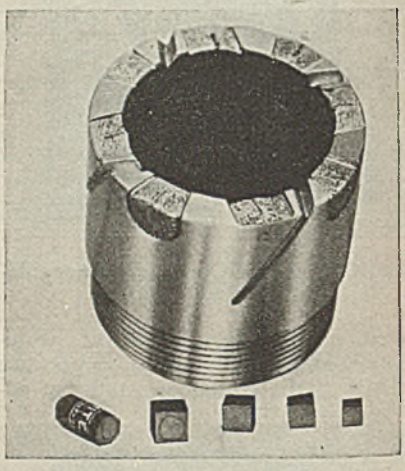
In such places as mines, chemical plants, paint and similar plants or where inflammable materials are used or fumes, oil, dust and gases prevail and arcing would be dangerous, the Hart Manufacturing Co., Hartford, Conn., recommends the new mercury tube toggle switch. This is a single-pole safety switch in capacities up to 25 amp. and 125 volts. Convenient knockouts are placed on each of the four sides for simple adjustment to conduit.



Toggle Switch, Cover Removed

New Material Replaces Expensive Diamonds

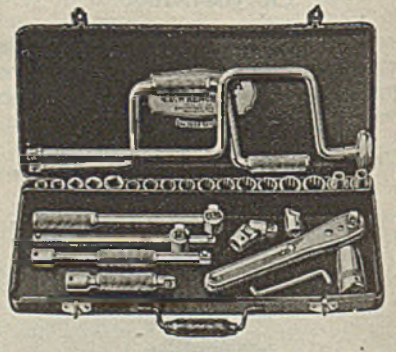
The Sullivan Machinery Co., Chicago, Ill., has developed "Sulamite"—a metallic alloy having practically the same characteristics as carbon or black diamond except that it is not as hard—to replace the miners' diamonds or carbons, which have become expensive in late years. It is, however, considerably harder, according to the manufacturer, than emery, corundum and similar substances and has proved its superiority in the laboratory and in drilling work in the field.



Double-Tube Bit Set With "Sulamite"

Socket Wrenches Possess Important Features

According to the Blackhawk Mfg. Co., Milwaukee, Wis., the demand for tools of durability plus the utmost in refinement of finish and excellence of design and workmanship has been met by the development of the "Chief" set of de luxe tools. Three different sizes sets may be obtained containing up to 30 handles and tools. Double hexagon sockets, lock-on-sockets, either quick detachable or securely "locked-on" chrome vanadium steel, chromium plating and special metal cases are the chief features mentioned by the makers.



No. 30 C. D. Set Containing 30 Tools