COAL AGE

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

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SYDNEY A. HALE
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H. W. CLARKE
Publishing Director

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MODERNIZATION AND PROFITS

MODERNIZATION has been used so much as the theme song of a clamorous chorus of industrial evangelists that there is great danger repetitious emphasis may dull appreciation of the real significance of the term and so defeat the very thing for which they strive.

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IN THE COMMENDABLE ZEAL to impress industry with the necessity for scrapping the antiquated and the obsolete there is a tendency to hold up modernization as a fixed and final goal.

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ON THE EVE of another annual gathering to review the year's progress in coal-mine mechanization, therefore, it is particularly appropriate to reassess what the modernization movement actually means.

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MODERNIZATION is change, continuous betterment—a constant effort to reach an ever-receding goal. Only the past is static. The technical improvements of today are the industrial-museum history of tomorrow.

BECAUSE modernization must always be in a state of flux, however, is no justification for the attitude of mind illustrated by the unnamed British coal operator quoted in a recent issue of the New York *Herald-Tribune* as rejecting change because by the time one improvement is adopted and working properly a new one makes the first obsolete.

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ON THE CONTRARY, the fluidity of modernization gives to any captain of industry worthy of the name an opportunity to capitalize again and again on the improvements it enables him to effect in the operation of his business. There are no rewards for the laggard who embraces change only after it has become stereotyped practice.

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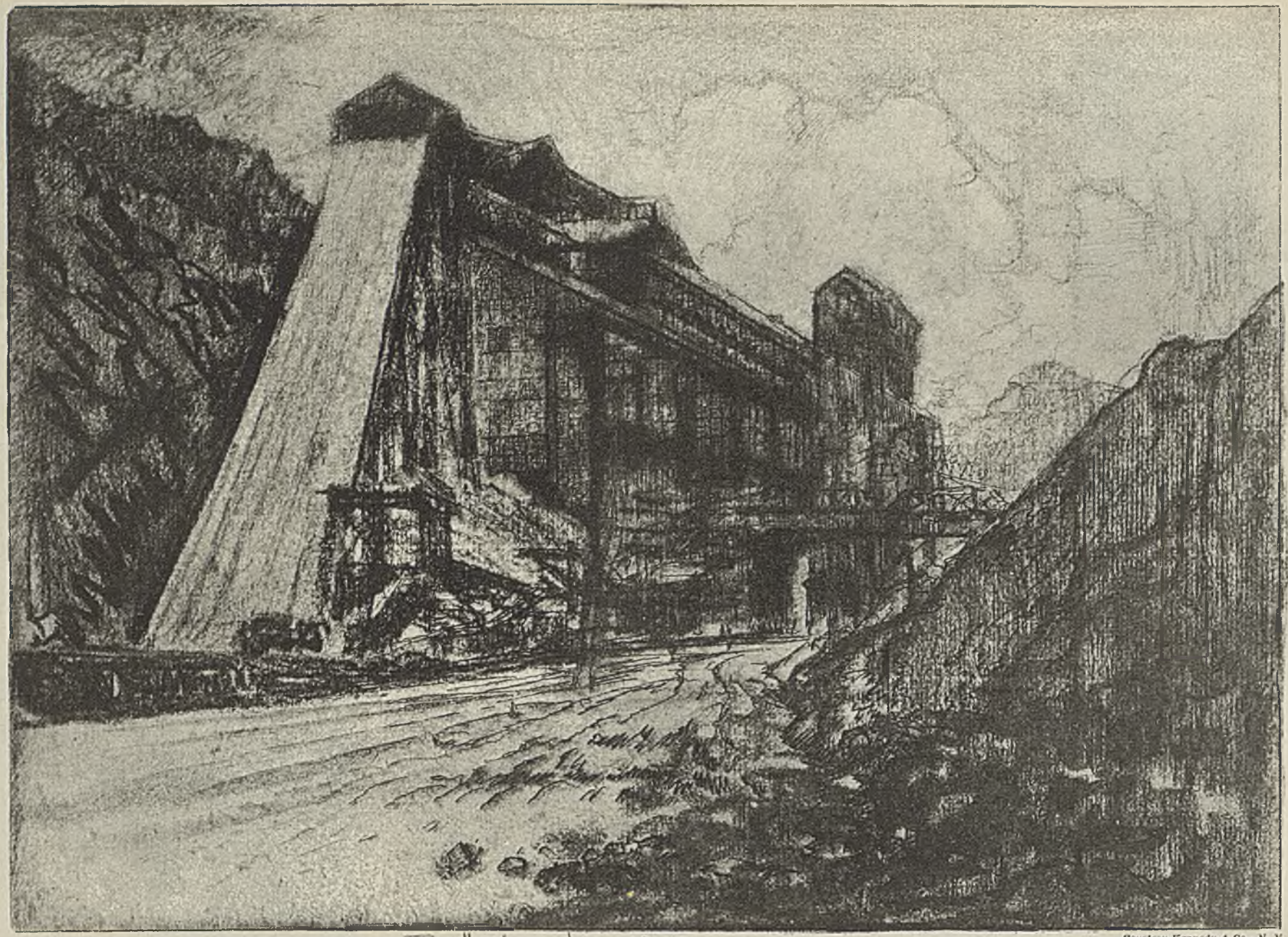
THE COMPANY that foolishly waits for stabilization of modernization before spending money for new processes and in new experiments only lengthens the distance between itself and success. While such companies delay until bolder spirits have paved a road as well as blazed a trail, the trail-blazers have moved on to newer ground, better methods, lower costs and new profits.



Courtesy Kennedy & Co., N. Y.

The Great Incline

PIT-CAR LOADERS

Sweep Into Foreground in Bituminous Mines

I . . . How Machines Are Worked at Mines of Superior Coal Co.

By J. H. Edwards
Associate Editor, Coal Age

"THE right to install mechanical loaders and conveyors of all types is recognized." Since the new Illinois agreement containing this clause went into effect on Sept. 16, 1928, over 1,000 portable conveyor car loaders have gone into use in that state. Reports of the operators' association showed that by the end of February, 1929, there were 928 units in use, loading 13.2 per cent of the output of the member companies as compared with 98 loading machines and 23 stripping shovels. Each of the latter two groups handled 7 per cent of the production reported for that month.

When it is considered that the rate for hand loading into a car is 91c. per ton and that the 8-hour day rate for loading onto a portable conveyor loader is $8.04 and further that 20 tons can be loaded onto a conveyor with about the same physical effort required to load 10 tons in a high mine car, it is evident why these conveyors, costing as little as $700, have rapidly found favor. Another advantage is that the introduction of conveyors as an aid to the loaders need not disturb the other classes of work in the mine. The effect is so simple that it might be likened to furnishing each loader with a larger scoop which by some magic can with its load be lifted with less effort than the ordinary hand scoop.

At least ten manufacturers of importance are building mine-car loaders of the conveyor type. The weights of the units range from 1,000 to 4,000 lb. and the prices from $650 to $2,400. Most of the machines fall in a class weighing 1,400 to 1,800 lb. and sell for around $750. These are not self-propelling. Generally speaking, they are exceptionally well built. The motors, which are of 1 to 2 hp. capacity, are totally inclosed and are equipped with ball or roller bearings. Conveyor shafts also are equipped with anti-friction bearings and are fitted for pressure grease lubrication. Some of the machines have copper-content steel for the sheet metal parts.

In over-all length this medium-weight class of loaders runs from 14 to 18 ft., except where built with a boom of extra length for long mine cars. All are equipped with a device for elevating the boom end to compensate for irregularities in car height and mine bottom. The type of device used for this purpose consists principally of a rack and pinion for adjusting the axle position with respect to the rest of the conveyor. One manufacturer, however, furnishes a light-weight floor jack for raising the boom end. Another accomplishes the same result by use of an offset axle. As to normal heights available, these run from 30 in. to 6 ft.

Variations of design to reduce the distance of hand shoveling in wide places consist of swivel wheels, an auxiliary swivel-nose conveyor and a combination turntable extension chassis. Judging from the number in use, the plain type conveyor, without these refinements, has found the greatest favor.

The lightest machine, and one of a late design, weighs only about 1,000 lb. and is equipped with a ¾-hp. motor. It is asserted that if necessary one man can move it from one working place to another. This type, like the 1,400- to 1,800-lb. conveyor, is moved

RECENT MONTHS have witnessed a truly astounding growth in the use of pit-car loaders in the bituminous mines of the country. A little over a year ago less than 100 of these machines were at work, according to Dr. L. E. Young, chairman, mechanization committee, American Mining Congress; today there probably are over 1,000 in use in Illinois alone. Colorado, Indiana, Kentucky, Montana, Ohio, Pennsylvania and West Virginia also are experimenting with these machines. J. H. Edwards, associate editor, *Coal Age*, has been touring the mining fields where this equipment has taken hold and the first fruits of his investigations are embodied in this article. Other studies of the use of these machines will appear in subsequent issues.

Light Weight Makes It Practicable to Take This Conveyor Off the Track Onto the Bottom Coal

* * *

by pushing down on the boom until the whole machine is about balanced on the axle and then rolling it along the track like a two-wheeled cart.

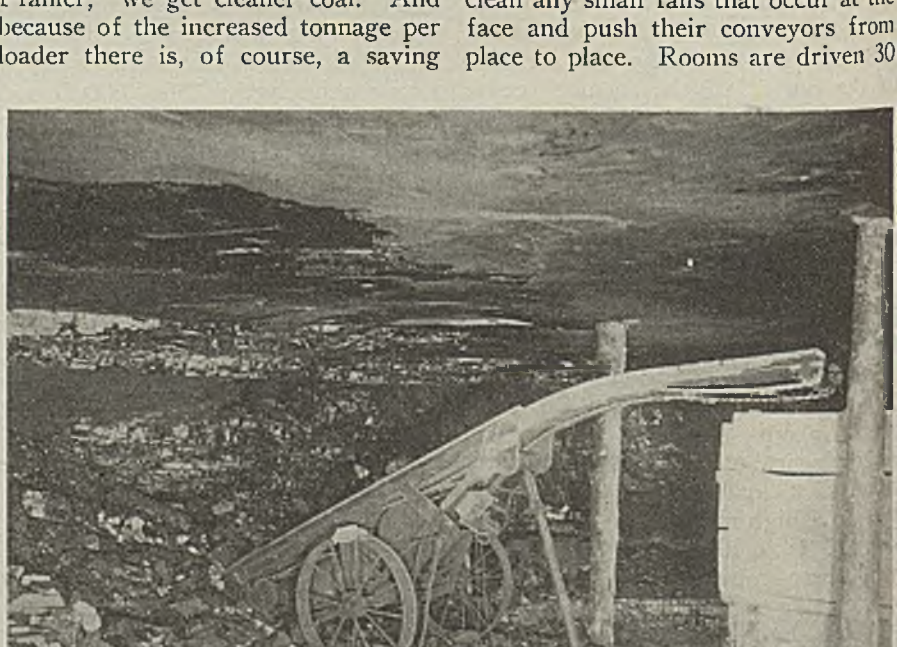
In many instances the mine officials have been reluctant to release production figures, one reason being that they have not had time to make the showing that they know is possible. In February the following average productions per conveyor man were being maintained or bettered at three representative Illinois mines: 16 tons, 17.5 tons, and 21 tons. Each of these mines is in the No. 6 seam and is 100 per cent on conveyor loading.

ONE of the first companies to put a mine extensively on conveyor loaders was the Superior Coal Co., which is owned by the Chicago & Northwestern R.R. Two of the four mines, which are located near Gillespie, Ill., are completely equipped. The No. 4 mine contains 112 of one make and type, and No. 1 contains 89. Forty of the latter are of one make and 49 of another. Five of the 49 are of the turntable type. All of the No. 4 conveyors have a longer delivery end than standard; this in order to load the long 5-ton cars used at that mine.

"We have found accidents at the face to be almost nil with the conveyors," said F. S. Pfahler, general manager. "The men tell us that with hand loading they naturally tend to finish a car before pulling down a doubtful piece of top, but with conveyor loading they do it immediately because it is done on company time. For the same reason," continued Mr. Pfahler, "we get cleaner coal. And because of the increased tonnage per loader there is, of course, a saving in timbering and other costs that depend upon production per unit of territory. To say that the territory can be reduced to approximately half is conservative. In a mine developed for conveyors from the start there also would be a considerable saving in ventilation."

In the middle of February the 170 loaders in the No. 1 mine were producing an average of 2,900 tons per day. At that time four of the 89 conveyors were out of service because of being sealed off in a fire area. Working conditions in the No. 1 mine are similar to those in other mines of the No. 6 seam except that possibly the roof is not so good and a number of "horsebacks" are encountered. The coal thickness in this locality averages 84 in. and the blue band, a hard slate parting 2 in. thick, is 18 in. from the bottom.

The coal is undercut by shortwall machines and then each place is snubbed by three shots placed just above the blue band. The loaders clean out the snubbings and at the same time throw back most of the blue band refuse. Sometimes they load this coal directly and other times move it back only far enough to allow efficient shooting of the main coal. The loaders also set timbers, lift the bottom coal left below the undercut, clean any small falls that occur at the face and push their conveyors from place to place. Rooms are driven 30 ft. wide with a track in the center and two rows of props are set on each side of the track. The panels are sealed with the 30-ft. pillars left standing.



This Type Is Kept on the Track or on Wooden Extensions

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All over the mine the work is standardized into units, each consisting of sixteen loaders equipped with eight conveyors, one machine man and

helper, one shotfirer, one motorman, one brakeman and one driller. Also there are one track layer, one timberman and one foreman for each two units. The driller and shotfirer stay together much of the time and often help each other.

While loading all but the center portion of the coal in a room it is the usual practice with the lightest type of straight conveyor to roll it off the end of the track and onto the bottom coal. This shortens the hand-shoveling distance. With the heavier type of straight conveyor two 2x8x7-ft. pieces of pine are used for extension rails or runners, allowing setting the conveyor at an angle to the face. The same effect is accomplished with the turntable type without taking the machine off the track, but its added weight, of course, is a disadvantage in moving.

Hand loaded, the cars averaged 6,000 lb. Now with conveyor loading they average but 4,800 lb., even though sideboards 10 in. high have been added to the two sides and one end, and a 4-in. board to the other end. Because of the smaller loading and consequent reduction in hoisting capacity the mine is now considered a 3,000-ton operation instead of one of 4,600 tons. The present goal of the mine officials is to boost the average car loading to 5,000 lb. and to systematize and co-ordinate the work so that each conveyor will produce sixteen mine cars per day. According to Alex Duncan, mine manager, the need for cars of 7 or 8 tons capacity has become evident.

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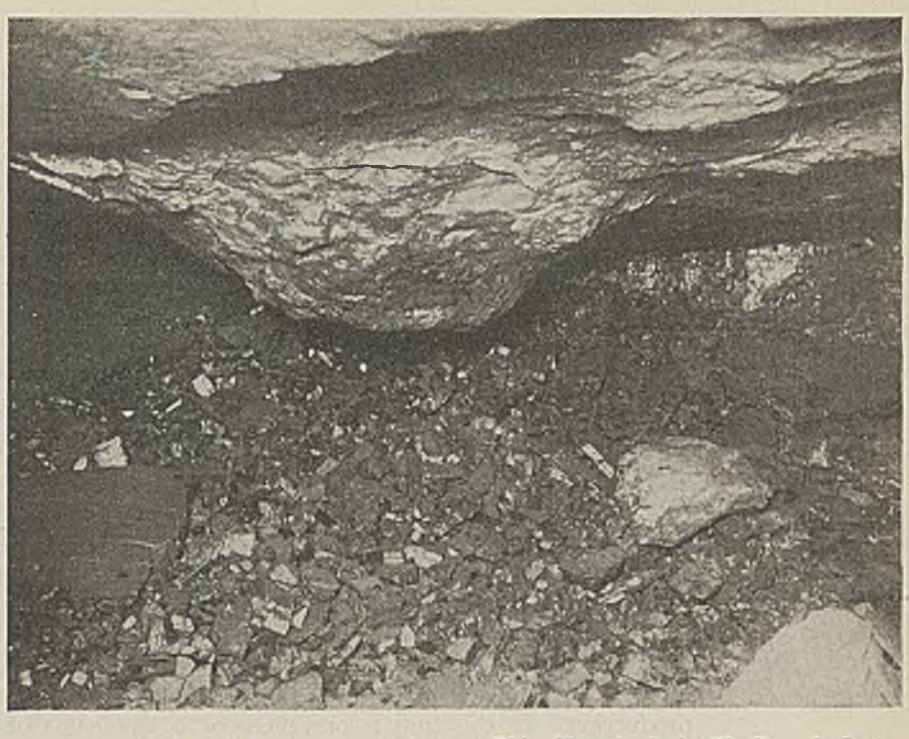
The Turntable Type Allows Offsetting the Conveyor and Placing at an Angle to the Track



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This Horseback in 7½ Ft. of Coal Comes Down to Within 4½ Ft. of the Rail

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One of the most striking developments of the year [1928] *is in connection with pit-car loaders. Whereas a year ago there were four companies building this type of equipment there are now ten and the number of units reported in use has increased from less than 100 in 1927 to more than 1,000 in December, 1928.*—L. E. YOUNG, *vice-president, Pittsburgh Coal Co., in Coal Age, January, 1929, p. 15.*

* * *

To the few conveyors of the turntable type three men are assigned: for the reason that these conveyors are working in territory that is being hurried to completion. Experience in the No. 1 mine has demonstrated that the tonnage per man is lower when three men instead of two are assigned to a conveyor. The place for the conveyor is with its nose close up to the coal, which gives convenient working positions for two men but makes it awkward for the third man.

One of the conditions that have been a stumbling block to the improvement of general efficiency in union mines and likewise in many non-union mines is the practice of loaders quitting work before the end of the shift. The conveyor has practically eliminated this difficulty because the men lose a definite amount of pay if they come out before the end of the shift.

So far no practical way has been found in the Superior mines to utilize the conveyors as effectively for developing entry as for room mining. The new machines are used for this work but the tonnage per unit is definitely limited by the few working places available. It is the policy to make a mine 100 per cent conveyor or use none at all.

The Vital Problem of

CO-ORDINATION

THE - - - *as Paul Weir sees it*

THE ingenuity and resourcefulness of practical mine operators and of manufacturers of mining machinery have provided the tools of mechanization. While it is true that not all of these tools are perfect, they are being improved upon every day. In every mine, everywhere, there are some tasks which can be done by some mechanical device at a saving in labor. The problem confronting those in charge of production is the intelligent selection and application of mechanical devices to their particular mine or mines.

The efficient application of mechanical devices is a problem of co-ordination of those devices which, taken together, make up a unit of production. In this unit is one piece of equipment around which the plan of operation centers. In one mine this central piece of equipment is the undercutting machine; in another, the loading machine; in another, it is the haulage equipment. This central piece of equipment is given every advantage and its efficiency approaches 100 per cent. This, however, usually is done at the expense of a decreased efficiency in the rest of the equipment working in the same unit.

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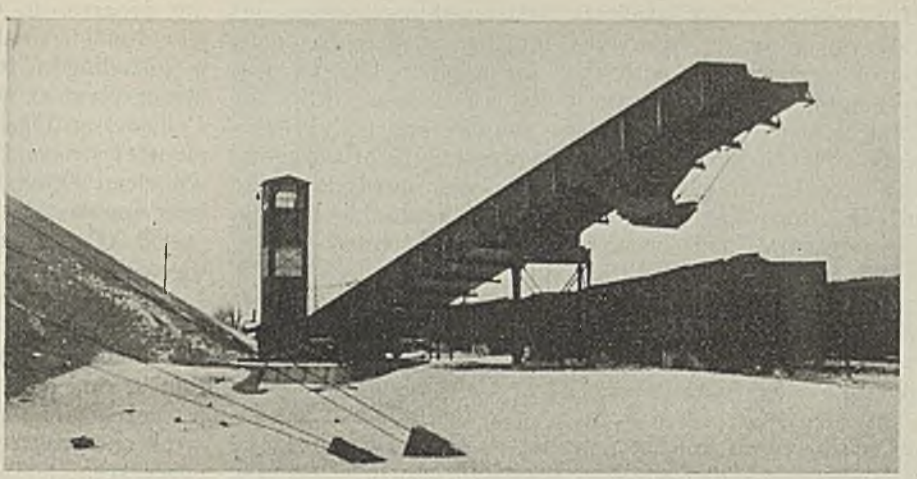
The ideal unit of production is one in which every device is doing the highest duty of which it is capable. The loading machine should have a continuous supply of loose coal to load. It should also have a continuous supply of cars at the loading end. The undercutting machine should have ready for cutting a large number of adjacent working places properly prepared for it. The drilling should be planned so that it will not interfere with any other operation, nor have any other operation interfere with it.

It is obvious that such ideal conditions never prevail because of breakdowns, changing physical conditions and the ever present human element. The capacity of a loading machine may be from one-half to twice that of an undercutting machine. The drilling capacity does not match that of either the loading machine or the undercutting machine. The capacity of any of these devices hardly matches that of a locomotive. The practical solution involves the balancing of work so that the combined efficiency of all mechanical devices is at the highest point. Everyone who has installed mechanical devices has experienced these problems. Intelligent co-ordination of the various devices in the individual units is one of the most important considerations in mechanical mining.

The changes taking place in the bituminous coal-mining industry in this country are many. None holds any greater promise for the future than intelligent mechanization.

Paul Weir

Chairman, Program Committee A.M.C. Cincinnati Convention



Radial Ramp Loading Silt at Marvine Colliery

ANTHRACITE REGION *Busy* REMODELING

Its Entire Breaker Equipment

By R. Dawson Hall

Engineering Editor, Coal Age

FROM early years cleaning has been a leading problem in the anthracite industry, whereas in bituminous districts coal was sent to market even up to the beginning of the present century without anything more elaborate in the way of cleaning than a little superficial slate picking by the car trimmer and a little hand cleaning by the miner. Recently the recognized standards in the anthracite region have been revised and the actual preparation standards have been even more greatly modified. As a result it is to be feared that, in the effort to secure a clean coal, much good combustible is being thrown away with the slaty material.

In years gone by in order to meet with market demands large quantities of good coal below chestnut size were thrown on dumps mixed with rock and boiler ash because the market would not absorb any size smaller than chestnut. Today a similar waste is to be feared. In order to secure a slightly higher grade of coal than is normal to the bed or beds being worked much excellent coal having only a little higher percentage of ash than is present in the better coal will be dumped out on the bank and a product will be marketed without the heat-sustaining qualities manifested by normal anthracite.

In saying this it must be understood that reform was needed, and in many cases is still needed, in coal preparation. No quarter should be given to slate in the coal nor to any machine that delivers coal containing slate, but the washing equipment should be such and so operated as to deliver coal without too great a loss of combustible values or the product which the public will receive will not be such as is dictated by its true economic interest.

To show how anxious the companies have become to deliver a super-product it may be well to recall what The Hudson Coal Co. has recently done to improve the stocks of coal it carried over from an earlier date, when the standards as to sizing and also as to bone and slate percentage were not as close as they are today. These stocks had accumulated because there would be a demand frequently for some sizes when the market would be light for the other sizes. Rather than shut down the plant the sizes which were not wanted were stocked, awaiting the day when they could be sold.

Then came the revision of the standards for oversize and undersize, bone and slate. Accordingly this stocked coal had to be re-prepared and at Duffy's Field, near Carbondale, Pa., where there were large stocks of chestnut and stove, a 15-ft. Chance cone with accompanying equipment was erected to re-prepare according to the new standards what had already been prepared, inspected and approved as in accord with earlier specifications. About 350,000 tons has been re-treated.

The battle of the cleaning processes is being aggressively waged in the anthracite region, and the outcome still remains in considerable doubt. Nearly everyone favors some particular process and some even prophesy an easy victory for his favorite system, though some, and they are not a few, give the field not to one but to all of them and say that each has its proper sphere of adaptation. As a rule, however, these advocates of distributed honors will not go so far as to delimit any particular areas or any certain classes of coal to the several contestants.

Among the more noteworthy developments in the anthracite region has been the installation of four 15-ft.

Chance cones in The Hudson Coal Co.'s 5,000-ton Marvine breaker, where an installation of jigs made as recently as 1921 is recognized as being already out of line with modern economic requirements. This breaker when constructed was considered to be the latest word in preparation practice both as to structure and equipment. The coal used to be cleaned in 44 jigs—four for broken, eight for egg, twelve for stove, twelve for chestnut, four for pea and four for buckwheat. Thus in a sense four units replace 44, and much space is saved, much labor, much vibration and much power. However, as the building is already constructed, the anticipated savings which caused the change were a reduction of the good coal going to the refuse bank, a decrease in labor cost and an improvement in the quality of product—achievements that should soon return the expense of the changes.

The four cones all wash the same class of coal; namely, everything but barley and silt, the barley being bypassed and going to the birdseye bin, where it mixes with rice from the cones. The slate from the cones goes to four slate shakers, where it is separated into egg, stove and undersize. The two larger sizes are then separately crushed in two pairs of rolls to chestnut and smaller, after which the crushed material is returned to the cones for recleaning. That which is good is thus redeemed and that which is not marketable falls through one of the sand shakers and goes to the slate bank.

At Jeddo a somewhat similar example of the transformation of a comparatively modern plant may be found. There the Jeddo-Highland Coal Co. has replaced its six egg jigs, six stove jigs, six chestnut jigs, and four pea jigs—22 in all—with two Chance separator cones, and this after only twelve years of operation. The old equipment was still good, but it was felt that the new equipment would give better service.

The list of jigs seems long and complicated enough, but, in addition, the egg and stove sizes after jigging were hand-picked industriously by eight men. The flat stove was separated by Norman mechanical pickers from the cubical pieces and then was treated on a spiral, whence it went to rolls and was crushed. The flat nut also, by similar equipment, was separated from the cubical and then washed. The flat coal was also broken down by rolls.

For some time No. 1 buckwheat after the first roughing by four jigs provided for that purpose has gone with the rice to four Deister concentrator tables. Henceforth the buckwheat and rice will both go raw to these cleaning units, for the material will not be passed into the Chance cones. The barley has not been, and will not be, treated but will be used raw for boiler fuel at the plant, because only in that manner can its full heat content be preserved.

AT JEDDO the slate is washed in a rock jig to make a middling product. This is crushed and after crushing rewashed in the Chance separator or on the tables so as to recover coal that without this additional treatment would be lost. The separators each use 4 or 5 tons of sand per shift of eight hours. In order to conserve power the sand sump has been placed unusually high at this plant. It is found that when this is done the speed of the pumps can be reduced, decreasing wear.

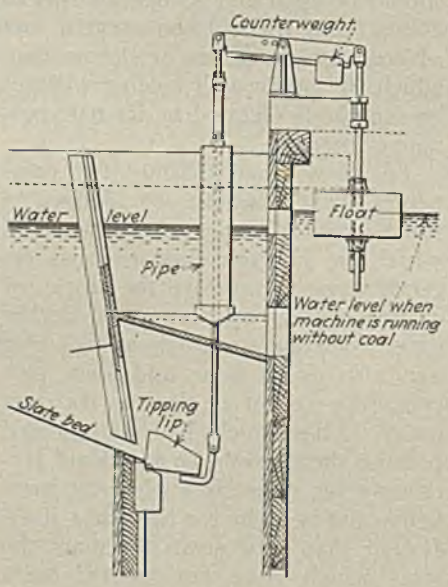
The changes from jigs to Chance separator cones were made while the breaker was working at capacity.

The washing plants of the South Penn Collieries Co. are using variable speed motors so that the speed of the sand pumps can be varied to overcome the effects of wear. A bleeding arrangement is provided in the sand sumps so that the sand can be freed of fine coal.

A Chance coal cleaner is to be erected at the Cameron bank of the Stevens Coal Co., near Shamokin, Pa., the equipment consisting of a 15-ft. cone. About 800 tons daily will be recovered.

The Rhéolaveur also has been making progress in the anthracite field The Lehigh Coal & Navigation Co. is installing a free-discharge Rhéolaveur plant at the Cranberry Creek Colliery, at Hazleton, for the treatment of rice and barley. This plant will clean 90 tons per hour and should be completed by about May 1.

Tipping Lip Which Regulates Slate Discharge



A 3,000-ton breaker will be built by the Rhéolaveur interests for the Lehigh Valley Coal Co. at the Dorrance Colliery. It will replace an old dry breaker which has been in operation at this point for the past 40 or 50 years. The new breaker will of steel and concrete and modern in every respect.

The Dorrance coal comes from several beds and reaches the surface through a four-compartment shaft. A new headframe with self-damping cages will be installed. The mine-run coal will be discharged onto a 42-in. belt conveyor 220 ft. long by which it will be delivered to the breaker located immediately west of the present structure. The Rhéolaveur plant will be capable of washing 400 tons of coal per hour from broken size (minus 4½ in.) down to No. 4 buckwheat or silt.

All the domestic-coal pockets will be fitted with spiral lowering chutes to minimize breakage. Six banks of shakers will be installed to size the coal. This is more than is ordinarily used, but great care is to be taken to meet the rigid requirements of the market as regards sizing.

Recently the Glen Alden Coal Co. replaced its jigs by Rhéolaveurs in the half of the Loomis Breaker that had not hitherto been thus converted. A Rhéolaveur is working at the Marvine Breaker just mentioned, preparing silt for shipment. The silt at this breaker is concentrated in a plant under the main building, where are housed a free-discharge three-launder Rhéolaveur plant and twelve No. 7 Deister-Overstrom tables.

This plant cleans not only the Marvine Breaker silt but silt from other breakers. During the day the tables treat the Marvine silt and the Rhéolaveur the silt from other points. During the night both tables and Rhéolaveur treat the silt shipped in from outside—the "foreign silt," as it is termed. The breaker now works only eight hours but the silt plant operates continuously.

The silt banks sometimes have tramp material in them which would interfere with the operation of the tables or the Rhéolaveur, and for this purpose a shaking screen was at one time provided. This made much vi-

bration and it was replaced by a Hummer screen with ¼-in. mesh.

The Rhéolaveur will treat 18 to 20 tons per hour, bringing the ash down to 12½ per cent. The recovery is about 65 per cent of the feed. After cleaning, the silt passes over a ¼-mm. wedge-wire shaker screen for dewatering. The tables each clean about one ton per hour. The coal after being cleaner goes to four Dorr classifiers which reduce the ash about ½ per cent. The classifier rejects runs about 47.5 per cent ash and is extremely fine, most of it being minus 200-mesh. It contains much pyrite.

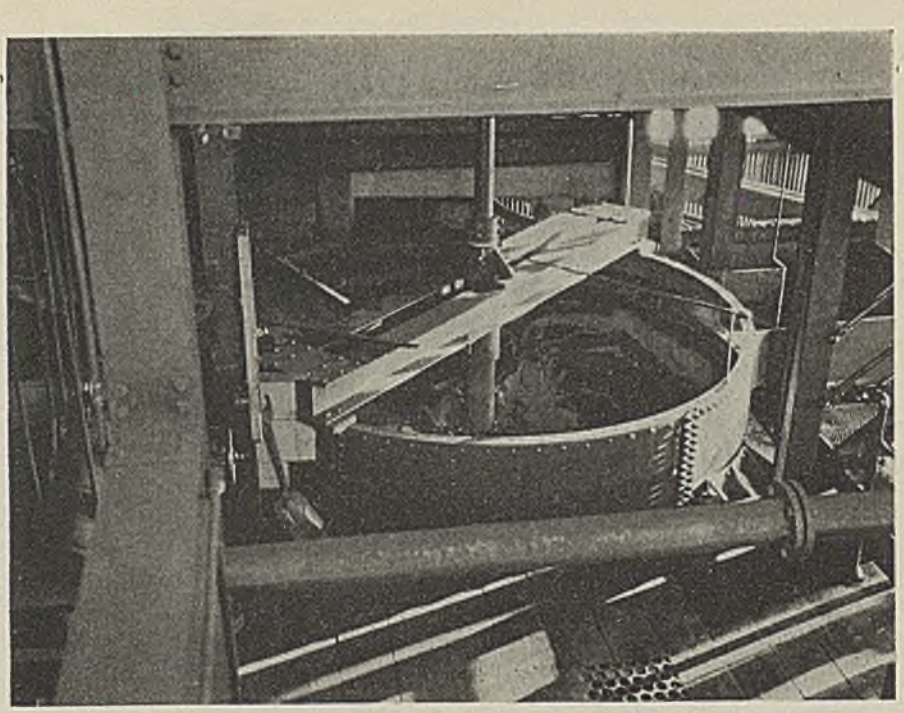
The tables and classifiers together lower the ash in the raw silt, which runs from 22 to 28 per cent, down to 12½ per cent. The cleaned silt from the tables also represents about 65 per cent of the feed. The tables reciprocate 1¼ in. 265 times per minute. The coal is used for smelting, for which it is well suited owing to its non-coking quality. Some is sold for briquetting.

It is stored before shipment by A-frame piling equipment. About 50,000 tons can be piled under the frame, but the coal can be panned out so that a stock of 110,000 tons can be accommodated. The silt is loaded into railroad cars by an R. H. Beaumont radial ramp which revolves around a center and is fed by a drag scraper operated from a tower. The scraper runs to the dump and is drawn to the bottom of the ramp and thence to its top, where the coal falls into the railroad car.

IN A short while the Jeddo-Highland Coal Co. will have a Simon-Carves washer in operation in its Jeddo No. 7 breaker, the first to be constructed in the anthracite region. This installation, following the usual practice in Jeddo-Highland breaker remodeling, does not disturb any of the sixteen present jigs, shaking screens, tables or other preparation machinery, so that any desired use of them can be made in combination with the new big jig.

In the event that this first attempt to jig all sizes intermingled is not a success, a smaller range of sizes may be jigged; in combination with the regular machinery a commercial product can be shipped while experimenting with the Simon-Carves jig. Ultimately it is expected that practically all the original preparation machinery will be supplanted by two such jigs.

In the last year or so the Hydrotator has been greatly modified. It is now quite closely contained. It always occupied but little space and this recent development has reduced its size still further and has improved the refuse end. The Candlemas Colliery installation of the Haddock Mining Co. was described in the March issue of *Coal Age*, pp. 162-163. At this plant are two Hydrotators washing barley and rice to comply with a 15 per cent ash specification.



Chance Cone at Jeddo, Taken When Idle

At the Greenwood Breaker, Seek, Pa., the Lehigh Coal and Navigation Co. has a 35-ton Hydrotator which has apparently a real capacity of as much as 50 tons per hour. It is cleaning No. 3 buckwheat, or barley. It is said to reduce the ash in the coal to about 12 per cent. The slate will run above 65 per cent non-combustible. This is a 5-ft. unit. It has a 6-in. pump driven by a 7½-hp. motor. The Westwood Colliery of the Hazle Brook Coal Co. is washing silt below $\frac{1}{16}$ in. with a Hydrotator. Large Hydrotators have not been built, but within the sizes already constructed it has been found that the larger they are the better they work.

The Menzies washer has made much progress in the anthracite field, cleaning hitherto only the smaller sizes though it is contended that in the anthracite region, as has already been proved in the bituminous region, this washer can be adapted to the cleaning of the larger sizes of coal. An improvement has been made that makes its regulation automatic and many of the Menzies Hydro-separators already in operation have been fitted with the new device—a tipping lip that lifts when a float descends and thus holds back the slate.

When the water rises in the slate conveyor trough the float ascends and the tipping lip is lowered, thus liberating the slate gradually until the balance is restored. Thus the operation of the equipment is regulated to suit the quantity of impurity in the feed.

A FLOAT-AND-SINK test at 1.80 sp.gr. showed that barley had been washed so that 99.07 per cent of the clean coal floated and 0.93 per cent sank and 1.8 per cent of the refuse floated and 98.2 per cent sank. When washed rice was tested 98.27 per cent of the clean coal floated and 1.73 per cent sank, whereas 2.4 per cent of the refuse floated and 97.6 per cent sank.

Simplex jigs also are being installed and in larger units than ever. The Philadelphia & Reading Coal & Iron Co. has recently installed eight of 100-ton clean-coal capacity, which if desired can deliver as much as 150 tons per hour.

The anthracite region some years ago went from dry pickers to jigs so completely that almost every breaker and washer became wet except as to the larger sizes. Today another reform is under way. A few years will see every breaker re-equipped and many rebuilt. Vast improvements are under consideration. The profits of modernizing are so great and the need for meeting the demand for cleaner coal so pressing that the remodeling cannot safely be delayed. Everyone is talking of cleaning equipment and some have been financing it, without, however, definitely fixing the type.

The Human Element

Why Jeopardize Mechanization Plans By Slighting It?

By Alphonse F. Brosky
Associate Editor, Coal Age

SEVEN years have passed since the industry first took seriously to loading machines, conveyors and similar devices of advanced mine mechanization. During this period certain ventures in mechanization have failed. But as others have succeeded, the failures should not be cause for too deep concern. Failures have occurred in the past; they will recur in the future. By reason of them the industry at large has profited, though some individuals have suffered. The losses actually sustained are but the price paid for progress.

Behind these failures are a maze of factors which singly and jointly have contributed to the disappointing results. Undoubtedly a number of these factors are material conditions and cannot be altered. Almost invariably they are closely allied with human elements which can be changed. Consequently any broad analysis of mechanization failures must be confined largely to human elements. The object of this article and another that will appear in a later issue of *Coal Age* is to point out these human elements and to show their relation to the problem as a whole.

A number of failures in the past may be directly attributed either to the unbridled enthusiasm of some sales representatives in their promotional work or to lack of detailed knowledge of mining problems. Such sales representatives would brush aside any question with the remark that the difficulties would be overcome after the machines had been in operation a short time. Not a few coal companies have been gulled by such nice sales talk as "Install this equipment and it will lop off 10, 20 or 30c. from labor cost."

For the most part sales talk is now conservative. Reliable manufacturers of loading machines and conveyors now know much of what their equipment will or will not do. Coal companies making their first venture into the field of mechanization are not—cannot be—intimately acquainted with the application of newer types of underground equipment and should rely in some degree on the experience of the manufacturer. The alert manufacturer realizes the full significance of this responsibility and accepts it conscientiously.

RELIABLE manufacturers will not knowingly allow a misapplication of equipment. More and more they ask for the privilege of examing the mine in which the equipment is proposed to be used, and not infrequently the inspection results in a cancellation of sales negotiations. An honest endeavor is being made by them to service the equipment promptly and on an equitable basis. They would do well to take into their organization men more intimately acquainted with the problems of mining.

Mechanization has now progressed to the point where individuals and regions are forming fairly definite opinions as to what types of machines are best fitted to their conditions. In earlier days they were willing to try almost any of the numerous types available. The first wave of eager enthusiasm having already passed, operating units are more guarded in their approach to mechanization. As these tendencies develop, the number of failures due to misapplication of equipment will decline.

Failures due to misapplication of equipment are more excusable than those growing out of management's indifferent attitude and its stubborn hold to certain traditional practices which oppose mechanization principles. As already pointed out, the mental attitude of management does more to cause success or failure than any other factor in mechanization.

Should mechanization interest those companies which already have achieved low labor costs for hand-loading methods? The attitude that neither conveyors nor loading machines have a place in low-cost mines is based on false premises. It has been largely responsible for the failures of these machines in such mines. Facing a hostile attitude at the outset, the machines are not given a fair trial. By contrast with excellent results from hand-loading, progress in mechanization appears slow and the machines are discarded without much ado. It is forgotten that machine practice requires years to mature as did cutting practice.

That attitude is indeed unfortunate—not so much for the broad mechanization movement as for the particular operators themselves.

While they continue content with their own records, other companies which heretofore mined coal at high cost have installed machines and are catching up with and forging ahead of these so-called low-cost producers. Without mechanization the low-cost producer of today must be the high-cost producer of tomorrow.

Yet another adverse attitude is displayed by companies that are disappointed in mechanization, not because the production cost per ton, all items considered, is more by machine than by hand but because the cost is not considerably less. Any company that has succeeded in matching costs, as between machine and hand work, has little room for complaint, granting the quality of product is not lowered.

It is true, as one general manager confessed as being the case with his company, that precedents have so shackled many producers to the old way of doing things that changes are seldom made to the benefit of the worker even though costs in the long run are not adversely disturbed. So long as men, for example, continue willing to push cars into or out of their working places that practice will continue.

TO TAKE a stand otherwise in such cases, it will be said, is poor business. Equally and perhaps more pertinent, then, is the question whether the premature wearing-out of men by back-breaking labor, without gain in dollars to prompt it, is good business. Low-cost production where hand methods are followed frequently means high output per man and much arduous labor of the sort machines eliminate.

Disinclination of operating officials to measure the working man—his feelings, point of view, capability, capacity and individuality—has been harmful to the cause of mechanization and has been the root of many failures. The severity of this charge is largely ameliorated by the fact that under the older system of mining by scattered working places and hand methods, to which the industry has grown accustomed, all workers, of necessity, are considered more or less as being of one class. The majority of underground workers in this system are coal loaders, all of whom perform a standardized set of duties. Whatever individual qualities they might possess are lost in the shuffle. Individuality can be discerned and measured only by comparison of one man with others in a group.

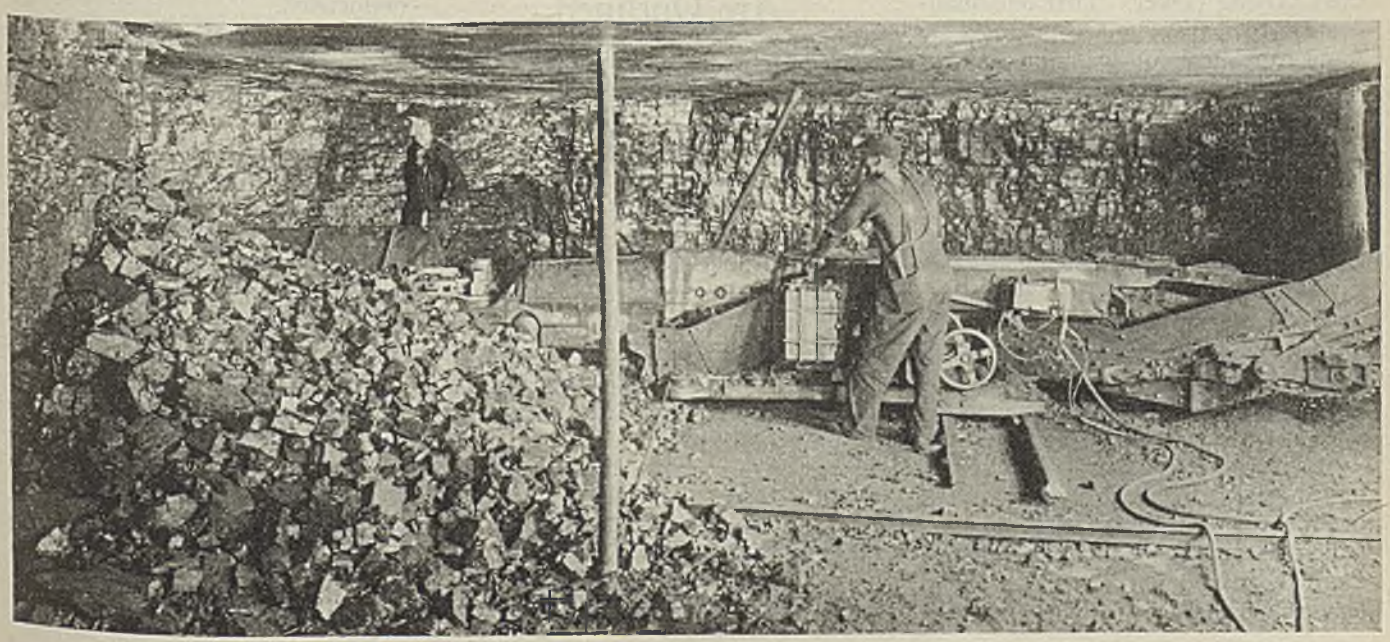
Mechanization tends to group men into gang units but it does not of itself foster individuality. That is management's job. Mechanization offers a wide division of labor and thereby management is given the opportunity to cultivate and profit from individuality by placing the right man in the right job.

IT may truthfully be said as a general proposition that the man is not made the foundation-stone for mechanization projects. He is given consideration secondary to the machine, the ton and the dollar. Why should he not be given first consideration? It is the man, not the machine or the ton or the dollar, that is the logical primary unit to be considered. The man is the agent that plays the most important rôle in the accomplishment of the project. He effects greater safety, larger yield and lower costs; not the machine, the ton or the dollar. He is the brains.

There has been in evidence a mental tendency to deny the worker the privilege of sharing in the profits of mechanization. When a company declares its unwillingness to adopt mechanized methods merely because they do not in its particular case give promise of a marked saving over hand methods, it reveals this mental tendency. Profits are not correctly expressed in terms of money only. If a man's labors are lightened, he has profited; if his years of productivity are prolonged, he has profited, and so has his employer. Normal progress in mechanization will be stifled so long as management adheres to the contrary viewpoint.

Opinions diverge on the question of wages for tasks incident to conveyor and loading-machine operation. Never equitably adjusted to the warranted demands of the mine owner and of the worker in days when mechanization did not extend beyond cutting, the question is arousing more intense debate with the extension of mechanization. The flat day rate has been the predominating basis for pay in mechanized mining. It invites listless working and "soldiering"; it fails of the objective regardless of the degree of supervision; it takes no account of the individual worth of workers. Fundamentally it is wrong.

THE flat tonnage rate, though it may appear to be management's attempt to evade the necessity for adequate supervision, fosters ambition in the men and so is better. Intense supervision together with a sliding incentive or a task-plus-bonus wage



These Men Have Been Put Into the Skilled-Labor Class

Few Men Will Do This Much Longer

is best of all. Scientific fixing of wages is virtually impossible in the older system of mining. The way is made easier for its application through mechanization. Until it is adopted the full beneficial effects of mechanization will not be felt.

The fact that a crew, on the promise of a shift's time, completes in, say, three hours a job which normally takes six hours—a common occurrence in mechanized mining—is the best indication of the need for scientific wage fixing and more rigid management. Under the stimulus of so great an incentive one might reasonably expect some reduction in the time for the completion of a job, but hardly a reduction as great as 50 per cent. This indicates the wide field open to improvement by better adjusted management.

Mechanization bosses sometimes are chosen solely on the strength of their driving power. That one qualification in a man, unaccompanied by some capability for planning and resourcefulness in bossing, by antagonizing labor deals mechanization a death blow. A man of this type attempts to push the job by sheer force. The result is that roundabout methods are followed and the men under him work considerably harder and accomplish less than they would if the job were planned before being executed. This same criticism applies to every step in the distribution of authority where management is weak.

If mechanization has failed in certain instances, in failing it has reaped for the operator a harvest of benefits which in later years will yield him more than would the money equivalent of his loss when invested in the older form of mine operation. It has taught diligence in the pursuit of system and orderliness underground. It has made plain the value of adequate car supply, prompt delivery of materials and supplies, timely execution of cutting, drilling, shooting, timbering and track work; in fact, it inspires prompt attention to every detail of the job. Many of these improvements could have been made under the older system, but in most mines they were not. If machines have accomplished nothing more they have at least blazed the way for greater efficiency. Which only goes to prove it is the man and not the machine or other material factors that demand greatest consideration.

Causes of Mine Fires Are Outlined

OPEN flames of miners' lamps, underground forges and fires for thawing pipes probably rank first among the causes of mine fires not classed as spontaneous, according to Bureau of Mines circular No. 6076, by K. L. Marshall.

"Such flames have had the able assistance of gas feeders, accumulated trash, oily rags and waste, dry timbers or lagging, oil and gasoline as the easily kindled media that supply heat to extend the fire into timbering and the material mined."

Fires of electrical origin are placed second. "Arcs are produced at all 'make-and-break' contacts in air. These 'makes' and 'breaks' may occur in the course of operating switches, commutators, trolley wheels or controllers during normal duty; or they may be unintentionally produced by defective circuits, such as loose and poorly made connections, partial short-circuits on exposed wires or broken bonds on track. Arcing at bonds on mine haulage tracks frequently is overlooked, especially when fine, as well as large size, coal spilled from cars has accumulated about the bonds. Under such a condition a fire is almost inevitable and is extremely difficult to control, as there usually is a strong current of air in the haulageways."

Heating of a material due to the resistance to the passage of an electrical current may cause fires. "Insulation of circuits or machine windings on heavy overload may ignite from such heat, or fires may be started in inflammable material adjacent to overheated circuits or machines; fires also may be started by the passage of current through high-resistance material (such as canvas, posts or timbers) in contact with electric circuits not normally overloaded. Ignition is more likely to take place when the material in contact with the circuit is damp."

Stray current is listed among the sources of mine fires, and the case of a tipple being set on fire by stray current in the steel headframe is cited as an example.

Third among the principal causes other than spontaneous combustion is the use of explosives. Growth of the use of permissibles instead of long-flame explosives such as dynamite and black powder has reduced the frequency of fires from this cause. When permissibles are not used the employment of "fire runners" to search for fires after shooting is commended.

Fires from friction in machine bearings and from ropes wearing against timbers are declared to be rare.

"Any extraneous inflammable material that is known to fire spontaneously on the surface can be expected to fire spontaneously, under favorable conditions, when taken underground. Oily material and 'trash' are especially likely to ignite spontaneously. Timber stored or in place is not commonly thought subject to spontaneous ignition, but care must be taken that such storage be kept free from even small amounts of finely divided bark, splintered wood, oily waste or any material that could furnish a small point of firing whence the flame might spread quickly to large proportions."

BLOWER FANS

In Mechanized Non-Gassy Mines

...Why Not?

By Frank V. Hicks
Director of Mechanization
Union Pacific Coal Co.

WITH due consideration for the arguments advanced against it, the writer is of the belief that the blower fan is an economic necessity in most mechanized *non-gassy* mines and will soon be in widespread use in every coal-producing state. This statement is not to be construed as a plea for less ventilation or less vigilance in the enforcement of regulations dealing with ventilation problems. The cutting machine, the electric drill, the trolley locomotive, as well as the blower fan, each has its hazards. Let's be consistent. Does not the human element enter too strongly to allow dependence on any one type of equipment to the exclusion of other types?

Much of the statute law relative to the quantities of air required for adequate ventilation of a coal mine is based upon tradition and not upon scientific fact and investigation. Little consideration has been given, in the formulation of laws relative to quantities of air, to the areas opened and standing unsealed or to noxious and explosive gases produced. In fact what might prove satisfactory in one mine is likely to be altogether unsatisfactory in another.

Few mines operating today have been opened with the avowed intention of mechanizing throughout. The problem of mechanization has been to change over a mine heretofore operated by hand-loading methods and to select machinery that will fit the old system with a minimum of changes, the aim being not to disrupt or completely nullify the original plan.

In making such a change the problem of ventilation is not a difficult one if existing laws can be modified but slightly to meet a changing condition. This can be accomplished without sacrificing the elements of safety. Little need be said of state inspection departments; they have their function to perform, which is to see that the laws as enacted are followed. Where inspectors are permitted to use discretionary powers, much will depend upon their liberal-mindedness, their common sense, judgment and progressiveness of ideas if there is to be promotion of progress within the industry.

Mechanization permits of concentrated mining to a degree unthought of under the system of hand loading in room-and-pillar mining. In mechanized mining it is not unusual to produce 200 tons from a single working place. It is not a difficult matter, therefore, to make a comparison of the relatively large areas that must be opened and maintained for a given tonnage in a hand-loading mine with the area necessary in mechanized loading to produce an equivalent tonnage.

NO great play of the imagination is needed to visualize the comparative ease with which a mine operated on the hand-loading system can be changed to mechanized loading and still be ventilated by existing equipment, if worked-out areas are properly sealed and the air coursed instead of being permitted to wander

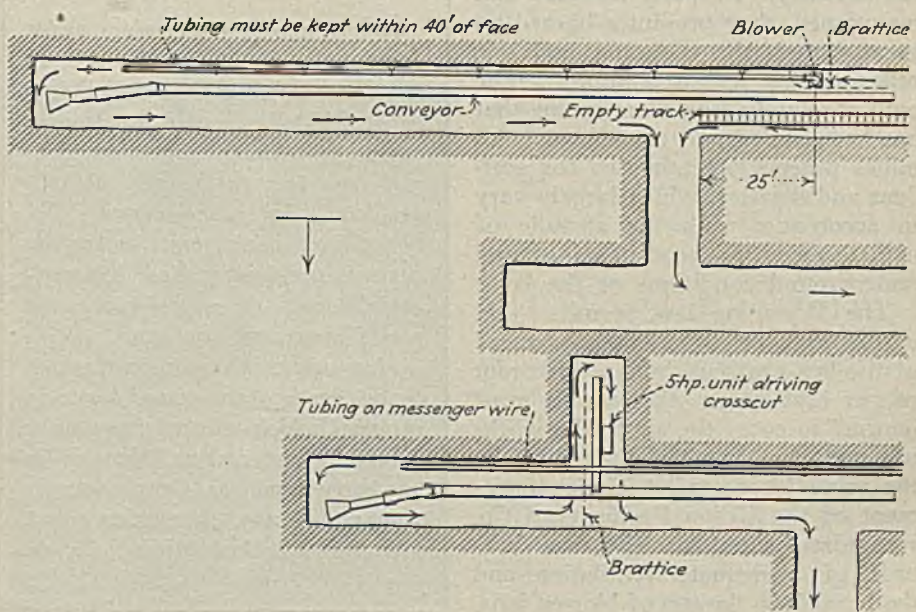


Fig. 1—Auxiliary Ventilation of Entry Faces Which Obviates Recirculation, as the Volume of Air at the Blower Intake Is Never Less Than Two and One-Half Times the Capacity of the Blower

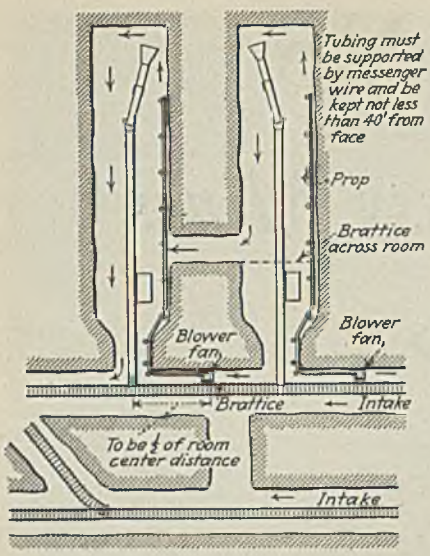


Fig. 2—Blower Fans in Room Ventilation Succeed Where Other Methods Fail, for Air is Conducted Direct to the Faces Through Confining Channels

through the mine. The tendency all too often is to under-ventilate, largely under the delusion that money is saved in power. The writer will hazard the statement that any saving so made may be lost many times over in extra cost of cleaning rock falls and replacing timbers that have failed because of poor ventilation.

Fortunately for the coal industry of Wyoming, the State Legislature has granted concessions and liberalized the mining laws to an extent that mechanization not only is made possible but practicable and economical without jeopardizing safety. This has been no small factor in contributing to Wyoming's lead over all states in the percentage of coal loaded mechanically today.

Mere mention of blower fans creates a furor in many quarters of the industry. Properly installed and maintained, they present a hazard no greater than the thousand and one other things within a mine. The only absolutely safe mine is one that has been sealed and abandoned. All mines possess potentialities for accident and disaster, which largely vary in accordance with the attitude of management, independent of natural underground conditions or the laws.

The Wyoming law permits "that entries may be driven 300 ft. ahead of the last crosscut, but in this event proper brattice or other means must be used to carry the air to the working face, the same to be approved by the mine inspector." The management of the Union Pacific Coal Co. recognizes simultaneously the hazards of inadequate ventilation and the hazards in the use of blower fans. Accordingly it has formulated rules for the installation and operation of all ventilation equipment, and there is no deviation from these rules.

In Fig. 1 is shown the method of installing blower fans for ventilation of development entries. In no case must the blower be placed nearer than 25 ft. to the last crosscut or breakthrough. The fan at each installation must be surrounded by a curtain or brattice as shown. The volume of air passing through the entry in which the blower is installed must not be less than 2½ times the capacity of the blower on that entry. The foregoing rules apply also to the driving of uphill places. Crosscuts off main entries must be driven by means of a line brattice as indicated or the blower must discharge directly into them.

The permissible arrangement for driving rooms with blower fans is delineated in Fig. 2. Rooms must be driven in pairs as shown and connected by crosscuts every 50 ft. The volume of air passing on an entry in which two or more blowers are installed must be not less than three times the capacities of all blowers operating in that entry. Blower fans are used in non-gassy mines only.

The Wyoming law deviates radically from that of many other states in its reference to the use of blower fans; also in the fact that shooting during the shift is permitted if it is done by a certified shotfirer. These practices—if accompanied by rock-dusting, sprinkling, spraying of water on the cutter bars of mining machines, closed lights, examination of working places with flame safety lamps, use of permissible powder and electric detonators and much closer supervision, which mechanical loading guarantees—certainly are comparable from a safety viewpoint with hand-loading practices in other coal-mining states.

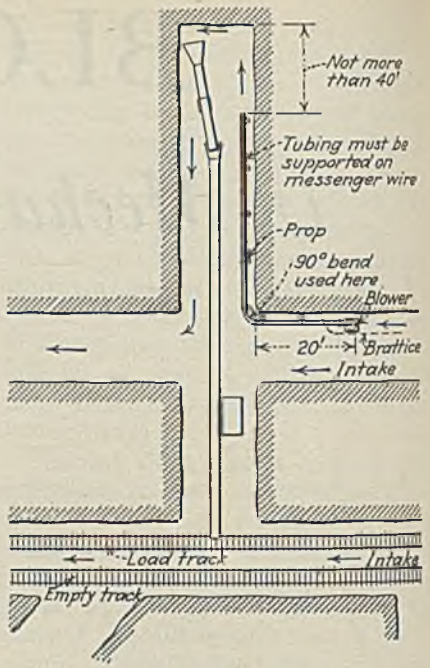


Fig. 3—Tubing and Blowers Have No Equal for Ventilating Uphill Places, Which Inclination of Workings Is Followed Wherever Feasible in the Mechanized Mines of the Union Pacific Coal Co.

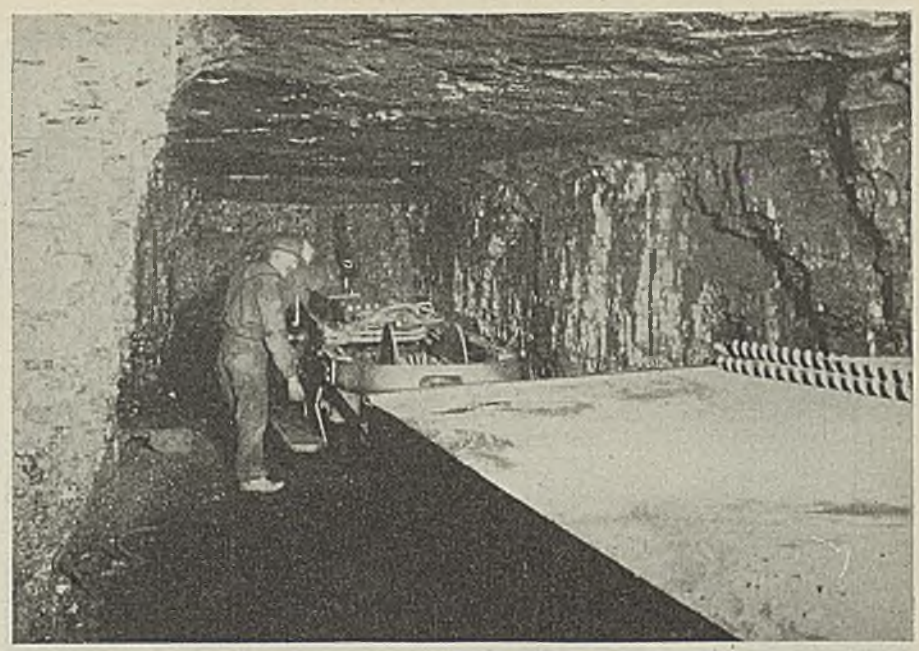
Mine ventilation can be no more reliable than the equipment that provides it all the way along the line. Realizing this, the Union Pacific company started at the outside and has taken every precaution to insure a continuous flow of air into the mines. Main ventilating fans installed at the mines of this company within the last five years are of fireproof construction, as are also the air drifts. All main ventilating fans in non-gaseous mines are electrically driven and equipped with automatic starters, open-phase relays, thermal couples on all fan and fan-motor bearings and pressure-recording gages. Fan motors are equipped with sliding-base take-ups and endless belts drive the fans. In no case is the distance between pulley centers less than three times the sum of the diameters of the two pulley wheels. Chart records covering the performance of the company's sixteen main ventilating fans show an over-all operation of 99.43 per cent of the time, 365 days of 24 hours each, in 1928.

Stock-Room Control

Where two or more mines under common ownership are located so closely together that supplies may be distributed economically from a central storehouse, stock-room control is not a particularly difficult problem. But when distance between the mining plants makes the central storehouse idea impracticable stock-room control becomes a real management problem.

How this problem has been solved by one large operator and a system installed which reduced inventories nearly 50 per cent will be told in an early issue of Coal Age *by James H. Hugg, purchasing agent, Madeira-Hill Coal Mining Co.*

How the Storage Battery Is Fitting Into Mechanical Loading



Combination Undercutter and Shearer and Its Battery Power Unit

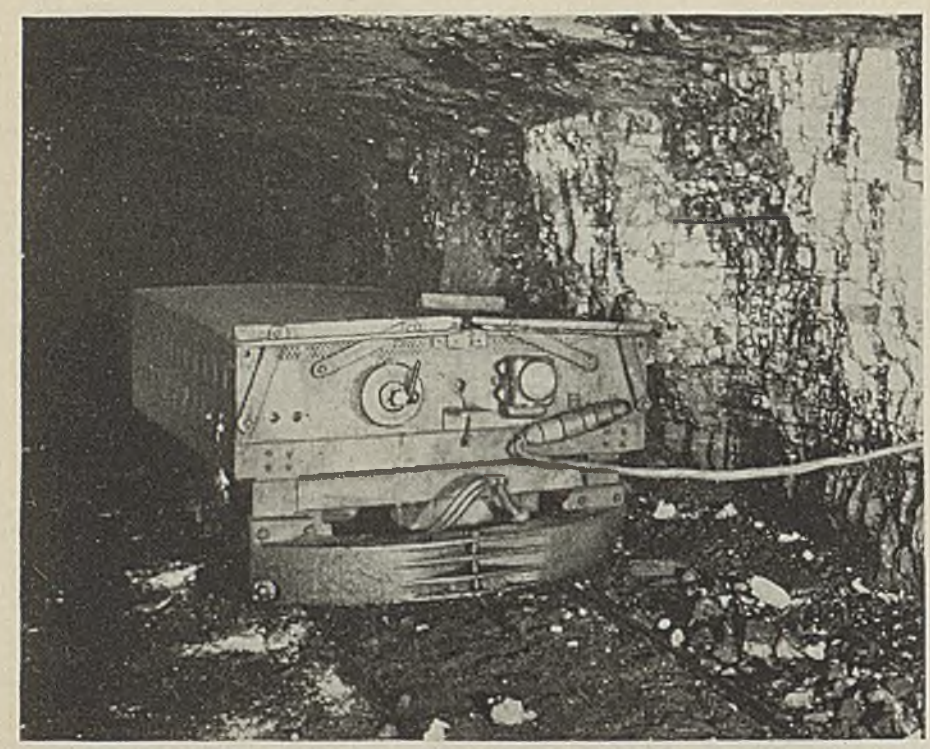
THE storage battery gives promise of taking a more prominent place in the picture of mechanical mining. The industry has passed through several expanding stages in the use of the storage battery—first for hauling; then for cutting and drilling, and now finally, for loading. A trial of the storage battery in this last stage of underground service is being conducted in the Louise No. 2 mine of the Howard Gas Coal Co., which is working the Pittsburgh seam at Slickville, Westmoreland County, Pa. Here storage batteries are being used to cut, drill, load and haul coal recovered from the development of a new mine.

Predicated as it is on deliberate precision and continuity of operations, the success of mechanical loading requires a continuous and non-fluctuating flow of power to the machines comprised in the system. In outlining the factors which governed the decision to depend entirely upon storage batteries for power in the Louise No. 2 mine, officials of the Howard company explained: Overloads, tripping of the circuit breaker and low voltage are entirely avoided. Concurrent delays and retarded running of the machines, which are as much responsible as any other factor for failures in mechanical loading, are avoided. Savings—by avoidance of delay losses, by minimizing of electrical troubles due to inconstant power supply, by avoidance of power leakage, by elimination of long underground conductors and by switching of the major load from day to night—in the aggregate are sufficient to leave little doubt as to the potential suitability of the storage battery for extended use underground, particularly in narrow work. The safety which the storage battery insures is something else.

Louise No. 2 mine is being developed by drifting into a 250-acre tract of the Pittsburgh seam. The thickness of the coal varies from 7 to 8½ ft. and averages about 7½ ft. It is capped by the usual drawslate of the Pittsburgh seam, which ranges in thickness from zero to 2 ft. and averages about 6 in. Numerous "horsebacks" in the roof have been encountered which retards production to some degree. The maximum depth of strata over this seam is 100 ft. and the average is about 50 ft. While the seam is comparatively flat, the mean grade showing as approximately 0.5 per cent adverse to loads, the floor undulates and local basins dip to a maximum equivalent to a grade of about 2½ per cent.

Shotholes Are Drilled Electrically and Shearing Eliminates One Hole

The mine is laid out on a room-and-pillar system. Entries are driven 12 ft. wide on 50-ft. centers; crosscuts are placed at 90-ft. intervals inclined at an angle of 45 deg. The main entry is a three-entry system which follows the longitudinal center line of the tract. It is driven "half-on" with respect to the face and butt cleats of the coal. Secondary entries on the right are driven on the butt and those on the left on the face. These cross-entries are spaced at intervals of 540 ft. Though the main entry has been driven 4,500 ft. and the faces of this entry are but 2,000 ft. from the boundary, no rooms have



Power Tank, Source of Power for Loading Machine

yet been turned. It is proposed to drive the rooms 16 ft. wide on 60-ft. centers and 250 ft. long in a full retreat.

Only one loading machine is now installed. It is a Coloder, type F, which is furnished with power by a 120-cell, 25-plate Mancha power tank. This unit has an ampere-hour rating of 360 and a kilowatt-hour rating of 84.6. Cars are moved to and from the loading machine by a 6-ton storage-battery locomotive. This unit has 49 cells of 33 plates each, and ampere-hour rating of 480 and a kilowatt-hour rating of 46.11. A tandem locomotive is a part of the equipment. Each unit has 120 cells of 23 plates, an ampere-hour rating of 330 and a kilowatt-hour rating of 77.52.

One of the two units of the tandem locomotive is utilized for main-line haulage and the other as a source of power for the cutting machine, which is a Sullivan C.L.U. type with a 9-ft. cutter bar. If or when desired, one of the tandem-locomotive units may be substituted for the power tank serving the loading machine.

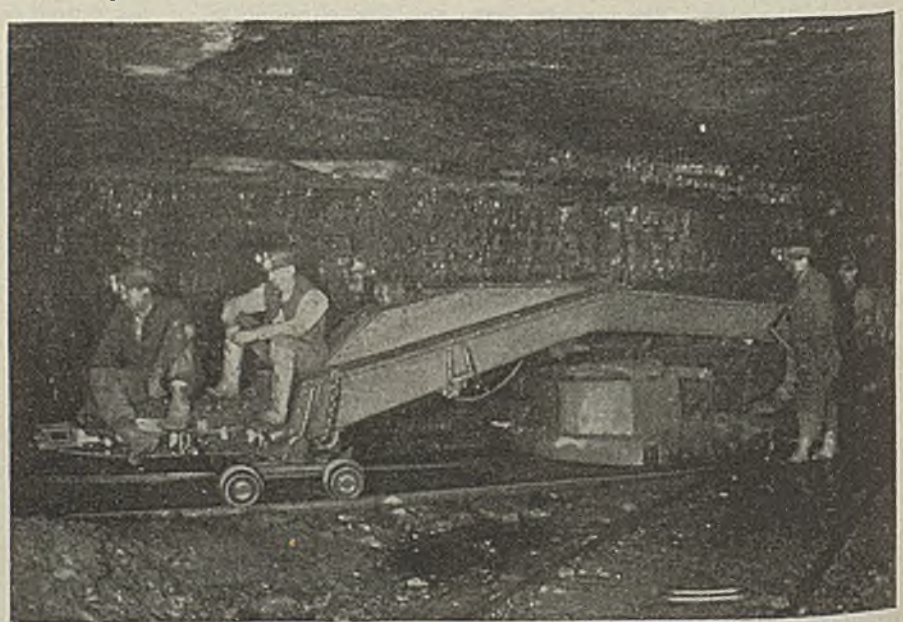
In the mining no roof coal is left to hold the drawslate above it, so after each cut it is necessary to take down the slate. This is done by a cleanup crew which follows after the mechanical loader. No undue hazard has been established by this practice. The coal being sheared, the roof is not disturbed by blasting. The coal is sufficiently loosened by two comparatively light shots to obviate the necessity of a man at the nose of the machine to pick down standing coal.

The presence of a man at the head end of the machine is of some assistance in the loading operation and under good roof a man is so stationed in places where the coal has not been properly "pulled" by the explosives. The placing of a man in this position is not vitally necessary and under bad roof the practice is not followed. Standing columns of coal topple over when the loading machine digs under them. If the coal were not first sheared, the machine could not take standing coal unaided by a man unless that coal were shattered by heavy shooting.

Under conditions existing in the Pittsburgh seam the shearing cut appears to be a necessity. Without it the coal cannot be brought down all at once with one round of shots and yield a maximum of large sizes. Without it the roof in many places would be so badly shattered that the drawslate would tend to come down with the coal and increase the dangers from this source. Undoubtedly the shearing cut is an aid to obtaining a cleaner product.

In Louise No. 2 mine this combination type machine has cut and sheared as many as sixteen places 12 ft. wide in 8 hours. Such performance, of course, can be attained only where places are closely grouped. Usually the machine cuts eight to twelve places in a shift. In maximum performance it has undercut an entry face in 9 minutes and 16 seconds and sheared a cut in 5 minutes and 2 seconds in this mine.

Shotholes are put into the coal by a Chicago Pneumatic, type PM., electrically-driven hand drill. The drill is carried on the cutting machine and is handled by the two men on that machine immediately after the shearing cut is made and before the machine is sumped out. Two 8-ft. holes are drilled in about 6 minutes. The writer saw one of these holes completed in about 2½ minutes.



A Locomotive Moves the Loader from Place to Place

A 12-ft. place yields 25 to 30 tons of coal. As the coal is loaded into 2¾-ton cars, eight to ten of them are required to complete the mechanical loading of a cut. The final cleanup of the little coal remaining is made by the follow-up crew, which also re-

moves the drawslate. The final cleanup yields one car or less of coal from a place.

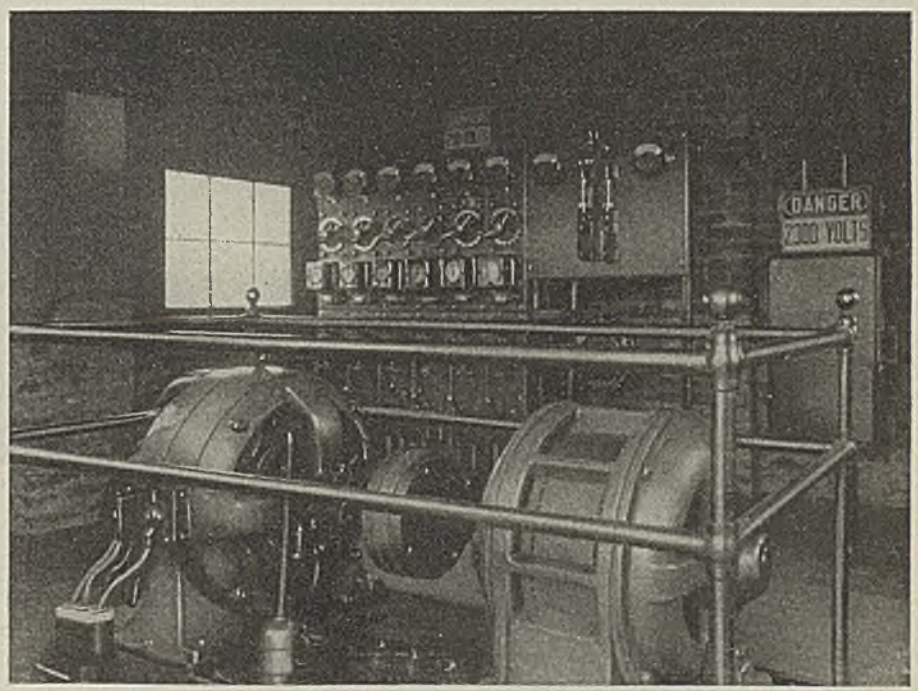
The loading machine will clean up six to eight places in a shift. If the places were more concentrated, which is not easily arranged in development work, the machine would load out more places, as a cut can be loaded with deliberation in about 35 minutes. It is common practice in dry places to take two cuts from one place in a shift and three cuts have been removed where conditions were exceptionally good. Drainage ditches and water entries have not been completed and much water has been encountered. The water unquestionably cuts down the speed of loading and shifting to a marked degree.

One immediately noticeable characteristic of the installation is the continuous and uniform performance of the machines themselves and their prompt response to the throw of the controllers. There is no slowing up of gathering and conveying chains on the loader or of the cutter chain on the cutter due to fluctuations of the load on a power line. Each machine, being free of encroachment on its power supply by some other machine, works steadily so long as the controller remains in an open position.

The locomotive which changes cars for the loading machine moves out like a scared rabbit and, while its speed is not so swift as the rabbit's, it is at least as steady as that of the turtle. Burnouts of motors are practically unknown. Delays due to mechanical and electrical troubles with the loading machine in 1928 averaged only 4.34 minutes per shift. The other machines were equally free from these troubles.

The unit which supplies power for cutting travels from place to place with the cutting machine. In the case of the loading machine, however, the arrangement is different. The power tank is stationed in a crosscut within convenient reach of a number of places, each by an independent cable. The number of places reached from any one station depends upon the degree of concentration of the places. Usually it varies from three to six. The conductor used is rubber-covered duplex cable.

As crosscuts are spaced at intervals of 90 ft. and as track is placed in the last of these, in a round trip the shifting locomotive travels 250 to 300 ft. Cars are changed regularly in about 1¼ minutes. Actually all of this time is not lost while the cars are being changed, as storage space between the front and rear conveyors of the machine takes much of the coal handled during the maneuvers of the machine while it is making ready for loading the next car. In entry work this time could scarcely be improved upon unless crosscuts were driven at closer intervals or two locomotives attended the shifting of cars.



Interior of the Charging Station

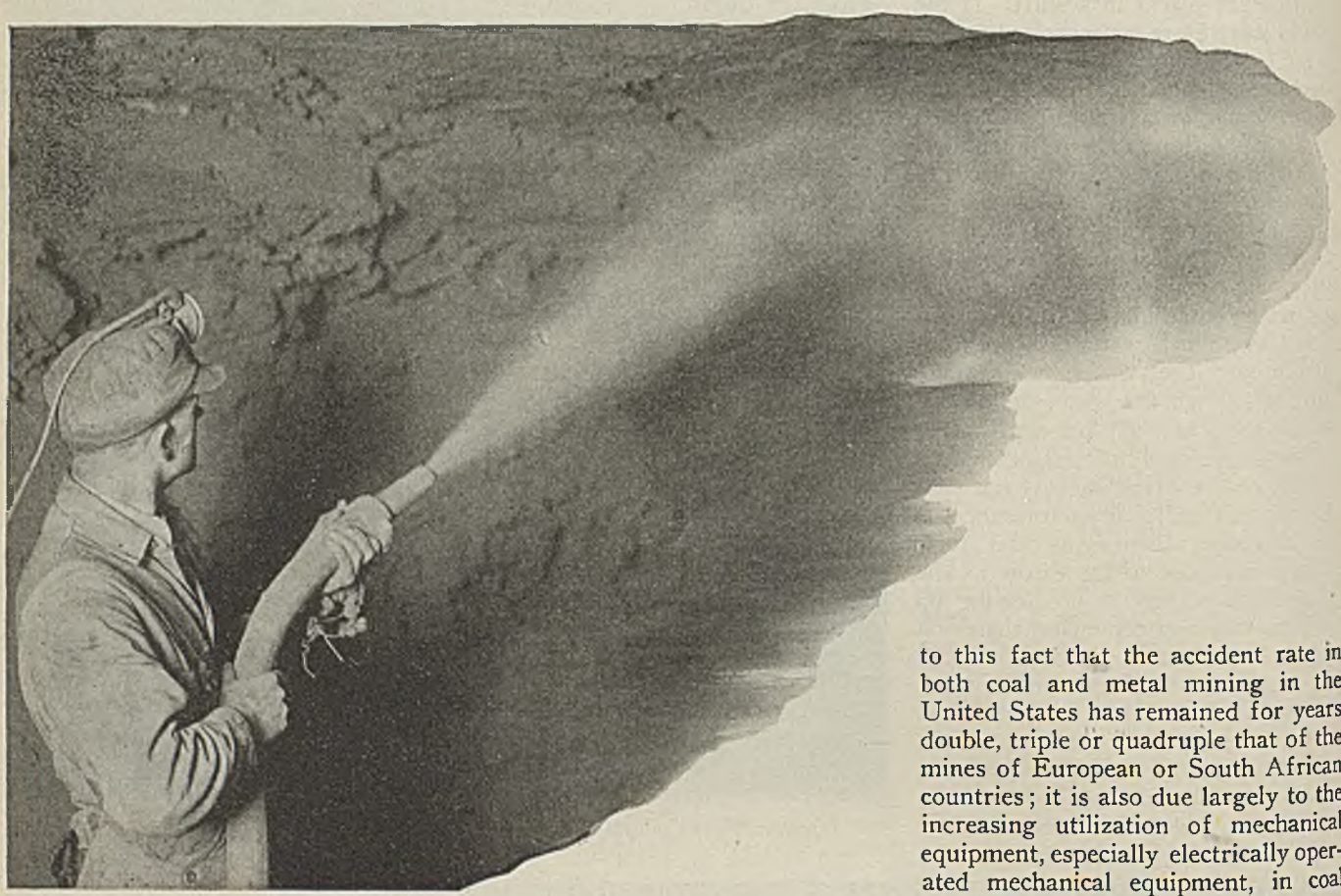
The company contemplates the installation of 5-ton cars as a means of improving the loading time when room work is commenced. Shifting of cars and machines is facilitated by the adoption of an easy curve in the crosscut tracks. The loading machine, which has a self-propelling speed of 0.85 mile per hour, is hauled from place to place by the car-shifting locomotive, which travels at a speed of 4 miles per hour.

The crew required for this battery of machines numbers thirteen men. Three man the loading machine, two attend the car-shifting locomotive, three compose the cleanup crew, two attend the cutting machine and drill, two are roadmen and one is a shotfirer.

In the first 331 shifts worked the loading machine drove 17,580 lin.ft. of straight entry and 3,025 lin.ft. of crosscuts, or a total of 20,595 lin.ft. of narrow work. This means that narrow places were advanced by machine 62.2 lin.ft. per shift and that each man directly employed in the work averaged 4.8 lin.ft. per shift. The yield of coal from these entries was 61,785 tons, or an average of about 187 tons per shift.

Battery Equipment Barn, Louise Mine

Growth of Mechanization



By D. Harrington
Chief Engineer, Safety Division,
U. S. Bureau of Mines

A BOOK entitled "Electricity Applied to Mining," by a British author, is given a short but keen review in *Colliery Guardian* of March 8, 1929. The following paragraphs from the review are peculiarly applicable to the conditions which obtain in the present intensive mechanization of mines in the United States, inasmuch as nearly all of the mechanical equipment now being so recklessly rushed into our mines, especially our coal mines, is electrically operated:

On the other hand, Mr. Cotton seems to us to have devoted too little of his space to a consideration of the all-important subject of safety and, in particular, to the characteristics of the electric spark as a means of igniting firedamp or coal dust, and a good deal more might have been said about the results of recent research work upon protective devices for coal cutters, switches, and the like. He has not a word to say about blasting or signaling, and his treatment of the portable electric lamp might have been extended.

These may be regarded as small fry by the power engineer, but the author could have escaped this criticism to some extent if he had chosen another title for his book. Certainly we have little fault to find with the book as it stands, since it faithfully fulfills most of the purposes for which it is likely to be consulted. As we might expect, the author puts up a very strong case for the choice of electricity, and he readily succeeds in proving the many advantages which it can show in comparison with compressed air. We believe, however, that the inherent dangers of electricity will for many years to come leave a considerable field open to compressed air, and the increasing employment of percussive machinery may tempt the mining engineer to use alternative sources of power for operating machinery that in other circumstances might be more efficiently driven by electricity.

Little as our mining men may desire to acknowledge it, there is no doubt that nearly every piece of mechanical equipment introduced into our mines adds to their accident hazard, and that is the more likely to be true when the mechanical equipment is driven or otherwise operated by electricity. It is due almost wholly to this fact that the accident rate in both coal and metal mining in the United States has remained for years double, triple or quadruple that of the mines of European or South African countries; it is also due largely to the increasing utilization of mechanical equipment, especially electrically operated mechanical equipment, in coal mines that it has been so difficult to make any appreciable reduction in our frequency or severity accident rate, although there has been a steady increase in the coal tonnage produced per fatality. In particular the explosion and fire hazards have been greatly augmented by the increased use of electricity in the mines.

THE hazards introduced into our mines by intensive mechanization are somewhat analogous to those introduced into our civic life by the rapidly increasing use of mechanical contrivances, such, for, instance, as the automobile and the flying machine. The solution of the safety problem brought into our mines by mechanization should be far less difficult than those introduced into our cities, counties and states by the automobile and the flying machine; however, in neither case can the ultimate solution of the problems be reached by trying to prevent the use of the offending devices or appliances.

In the past few years volumes have been written in the technical press and there also has been much discussion at our technical meetings concerning various schemes toward the further

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Means New Problems In Safety

mechanization of our mines, with special reference more recently to methods of loading and hauling material underground. The one feature which has stood out in practically all of this discussion is the disregard of practically all considerations of safety in either installation or operation; it is simply appalling to note the utterly unsafe methods and practices advocated and in many instances actually used in this intensive campaign directed toward complete mine mechanization. This lack of safety is apparent in methods of support or control of roof, haulage, blasting, ventilation, lighting, supervision—in fact, nearly every factor entering into underground coal-mining operations is involved.

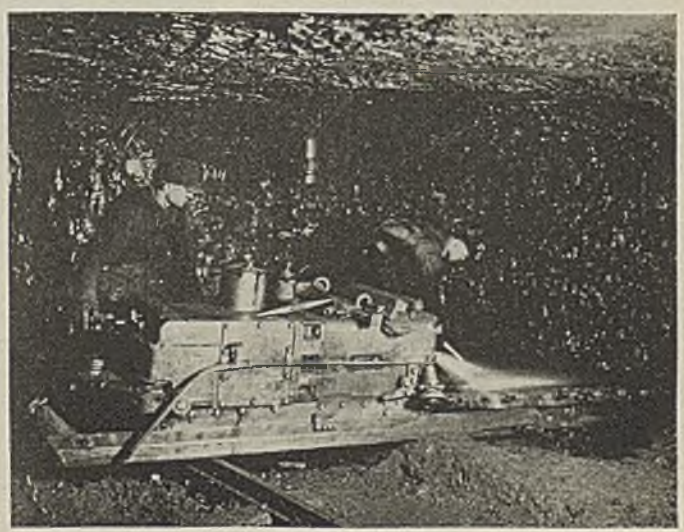
AT least one-third of the 1,000 to 1,200 persons annually killed in our coal mines by falls of roof and coal lose their lives in places where timbers have been knocked out by mine locomotives, mine cars, loading machines, etc. or where the space in which mining machines, conveyors, scrapers, cars, locomotives, etc., operate is allowed to remain untimbered. Practically all of the 400 to 500 fatalities annually caused by haulage accidents in the coal mines of the United States are due to mechanical equipment. Of the 300 to 400 persons who annually lose their lives in explosions and fires in our coal mines an ever-increasing percentage owe their deaths to explosions initiated by machinery; electricity generally is "mixed up" in the affair in some form or other; 282 persons were killed in coal mine explosions initiated by electricity during the fiscal year ending June 30, 1928—almost 83 per cent of the 350 persons who lost their lives in coal mining explosions during that period.

While few, if any, of the 80 to 100 fatalities occurring every year in our coal mines from explosives can be charged directly against mechanical devices or appliances, it is undoubtedly true that many deaths are due to the dangerous practices which have been brought about by blasting while the working shift is in the mine and which are chargeable to the urge to keep mining, haulage and other mechanical equipment in continuous operation and there is no question that this type of accident is going to increase with the necessity of producing more and always more coal to keep conveyors, scrapers, mechanical loaders, etc., from having idle periods. Many of the accidents from falls of roof, too, are due to the abnormally heavy shooting necessary to put coal in suitable form to be handled by mechanical loaders, conveyors and scrapers. Finally, all of the 80 to 100 persons who annually lose their lives by contact electrocutions in our coal mines owe their deaths to mechanization of some sort or other.

A Safety Precautionary Measure Too Frequently Omitted, Due Largely to Desire Not to Handicap Cutting or Other Machines

While it thus appears that at least 1,000 to 1,300—or at least half—of the 2,000 to 2,500 fatalities which occur annually in the coal mines of the United States, are traceable to mechanization, it would be utter folly to suggest that mechanical equipment should be excluded from our mines. Nevertheless there is no defensible reason why there should not be a much greater effort in the future than there has been in the past to avoid accidents of all kinds, including those brought about directly or indirectly by machinery. The need for such an effort is becoming especially urgent

Failure to Use Water on the Cutting Chain Causes the Air to Be Filled with Minute Particles of Coal Dust, Likely to Forward an Explosion



Permissible Undercutting Machines Using Water on the Cutter Bar While Undercutting; the Air Is Comparatively Clear of Dust

since there is under way a very definite trend toward the practically complete mechanization of our coal mines. The remedial measures suggested in this paper may appear radical, but unless they or some proposals akin to them are placed in effect, our coal mines are doomed to have a much worse rather than a better accident rate. Such a result would prove unfortunate not only because of the unfavorable effect on the public mind but also because of the effect on the purses of the operators, as there is every indication that compensation laws are being made more and yet more drastic; that of Arizona now provides for the payment of $50,000 or more under some circumstances for a single fatality. The measures proposed are as follows:

(1) There should be ample competent supervision. In general, this requires that there be at least an "always on the job in the mine" official or boss for approximately each 25 workers, and these bosses should be in full sympathy with the methods being used.

(2) As mines become more completely mechanized, ventilation should be much more carefully planned and maintained than it was with the older methods of working. Particularly is it essential that there be no form of intermittent or inefficient flow of air such as that which is bound to occur if dependence is placed upon flimsy stoppings, doors, regulators, etc., or upon any kind of underground fan.

(3) The driving of single entries or any other unconnected workings should not be longer than 200 ft.

(4) When the methane content of the air at any place or face is over 1½ per cent, no electrical equipment should be used in that place or on the return air coming from that place.

(5) Methane accumulations should not be moved while the working shift is in the mine. It is probable that under certain conditions the ignition of as small a quantity as 200 cu.ft. of an explosive mixture of methane and air may cause a widespread explosion.

(6) In any mine which is known to give off methane there should be no blasting of coal during the working shift if any type of electrical equipment is in use on the return side of the place or places where blasting is done.

(7) Only permissible electrical equipment, at all times kept in good repair, should be used at or near faces which are or are likely to be gassy or dusty. Open types of electrical equipment, such as conveyor or hoist motors, coal-cutting machines, drills, trolley or cable-reel locomotives, nonpermissible storage-battery locomotives, etc., are especially dangerous when used at or near working faces from which coal dust is given off, and are correspondingly more dangerous when explosive gas also may be present.

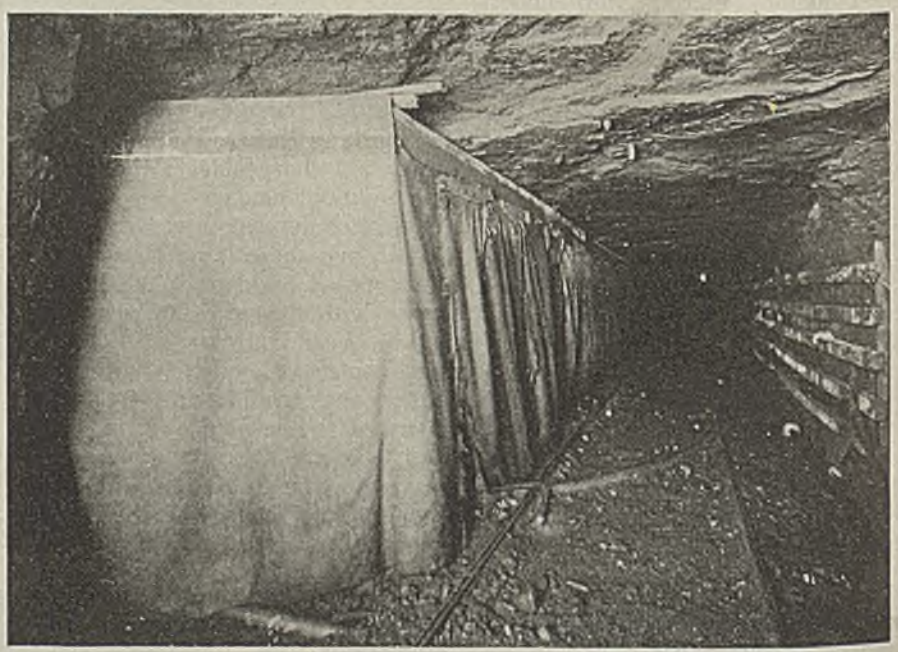
(8) Under no circumstances should trolley or cable-reel or nonpermissible storage-battery locomotives be used in return air in any mine which gives off or is likely to give off methane; and certainly no such locomotive should be allowed within 300 ft. of any face which gives off or is likely to give off methane.

(9) Electrical wiring should be thoroughly insulated, with main power lines preferably in heavily armored, well-grounded cables. All wiring should be well and safely supported and placed as far as feasible from possible contact by underground employees.

(10) Bare or poorly insulated wires or open electrical switches have no legitimate place in any coal mines; but where they are used they should certainly not be placed along or even fairly close to the roof in any mine where methane is or is likely to be given off. If bare or poorly insulated wires or open-arcing types of switches are used in any part of a mine where interruptions of ventilation may allow methane to accumulate, such bare wires or open switches should be kept fairly close to the floor rather than close to the roof.

(11) Incandescent electric lights and light wires are dangerous when used at or near faces that are or are likely to be dusty or gassy. It is generally believed that the recent Kinloch explosion in Pennsylvania, responsible for 46 deaths, was caused by short-circuited electric-light wires which ignited the dust in strictly intake air. Only up-to-date permissible storage-battery lighting should be used in any mine at or near working faces.

(12) Where at all feasible, no blasting should be done when the working shift is in the mine. All blasting in coal mines should be done by competent shotfirers using only permissible explosives shot electrically, with not over 1½ lb. of explosive per hole and with holes well tamped with incombustible matter (in other words coal dust should not be used for stemming). By far the safest method of coal-mine blasting is that where all explosive is kept out of the mine during the working shift, the holes loaded by shotfirers after the shift, and the firing done electrically from the surface with all persons, including the shotfirers, out of the mine.



The Line Brattice Should Be Used Much More Generally Than Is Now the Case, in Order to Assure That Gassy Faces Are Kept Clear of Explosive Mixtures When Machines, Such as Cutters, Loaders, Drills, Etc., Are Used

(13) While the above methods of blasting are absolutely practicable in addition to being safe it is recognized that many concentrated mechanized systems are dependent upon being able to blast at any time; hence, in an attempt to safeguard as much as possible a practice known to be inherently un-

safe, the following recommendations are given as to blasting practice when the working shift is in the mine:

(a) All holes should be loaded and fired by shotfirers.

(b) Only permissible explosive should be used in a coal mine, whether to bring down coal or to shoot rock. Certainly no black blasting powder or dynamite should be used in any coal mine while any men are in the mine. No hole should be charged with more than 1½ lb. of permissible explosive, whether the men are in or out of the mine, and a sufficient number of holes should be provided to allow using less than 1½ lb. of explosive per hole.

(c) Blasting should be done by permissible single-shot electric blasting units.

(d) All holes should be tamped with inert stemming.

(e) There should be no solid shooting of coal or "adobe" blasting of coal or rock.

(f) Holes should not be loaded and tamped while workers other than the shotfirers are closer than 25 ft.

(g) Under no circumstances should holes be loaded while electrical equipment, such as an electric drill or electric coal-cutting machine, is working within 25 ft.

(h) Preferably the face region should be well wet down before blasting.

(i) Workers should be withdrawn at least 500 ft. before blasting, and ample warning given haulage and other adjacent workers; loaders and other face workers should not be allowed to return after the blast until the blasted face has been carefully examined by a competent fireboss for explosive gas, as well as for roof conditions or possible missed shots. It is important that ample time be given to the above inspection to make it a thorough one; otherwise there are certain to be numerous disasters in the concentrated working of coal mines. Ample time likewise should be taken to remove any dangerous conditions before workers are permitted to resume loading and like operations.

(j) No electrical machinery of any kind and no loaders or similar workers should be allowed within 50 ft. of places where shots fail to detonate until the shots have been fired or the charge has been removed from the hole.

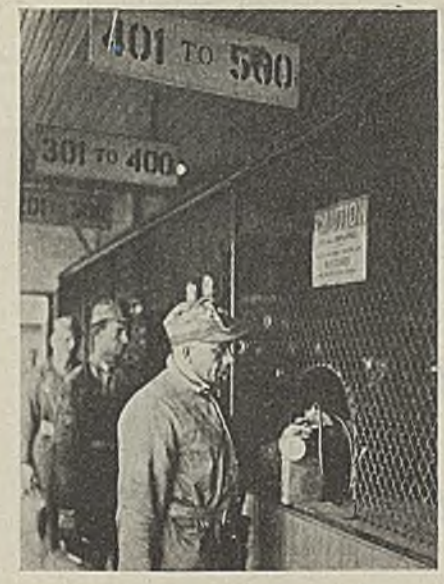
(k) The CO_2 method of blasting probably is the safest known method of bringing down coal while the working shift is in the mine, provided it is always used in accordance with the permissibility requirements of the Bureau of Mines.

(l) When and immediately after shots are fired during the working shift there should certainly be no open lights or any operating electrical equipment allowed on the return air from the place or places in which the blasting is done.

(m) Use of delay-action detonators should not be allowed for blasting while any men are in the mine.

(n) The use of two or more charges of explosive in one hole is dangerous and certainly should not be allowed in blasting with any men in the mine.

(14) Immediately after blasting sufficient time should be allowed to place timber before permitting the loaders to start operations. After blasting many accidents occur through overeagerness to start loading practically irrespective of roof conditions.



Use of Permissible Electric Cap Lamps, a Very Vital Safety Measure Frequently Not Utilized Where Mechanical Devices Are Likely to Release Excessive Quantities of Gas or Dust or Both

(15) When timber at or around mechanized faces is torn out by machinery or by blasting, there should be no delay in its replacement, even when such action may cause temporary interruption of the usual coal-producing work.

(16) In general it is much safer and even less expensive to protect groups of workers in the newer systems by use of cribs (which may or may not be removable) rather than to depend upon props. Props should be used as an auxiliary to the cribs or to supplement them.

(17) The noise made by machinery makes it difficult, if not impossible, to hear the usual warning sound given by overhanging roof or rib material before it falls. Every feasible means should be taken to reduce noise where mechanical equipment is used at or around face regions. In connection with certain types of mechanical equipment such as conveyors, the use of water not only tends to reduce noise but also aids materially in reduction of dust in and around the equipment and in the general surrounding atmosphere. In fact, water should be used with all coal-cutting, conveying, scraping and loading machines used at or near faces in mines where dust is given off.

(18) There should be ample, safe clearance for workers around mechanical equipment used at or near faces; the clearance should be such that workers are not required to pass over or under moving or electrically charged equipment with the possibility or probability of being injured when so doing. Moving belts, gears, etc., on equipment used at or near face regions should be safely protected by adequate guards.

In June

The convention and mining machinery exposition at Cincinnati, Ohio, May 13-17, under the auspices of the Manufacturers' Division of the American Mining Congress will be one of the high spots in the year for the practical operating men of the industry.

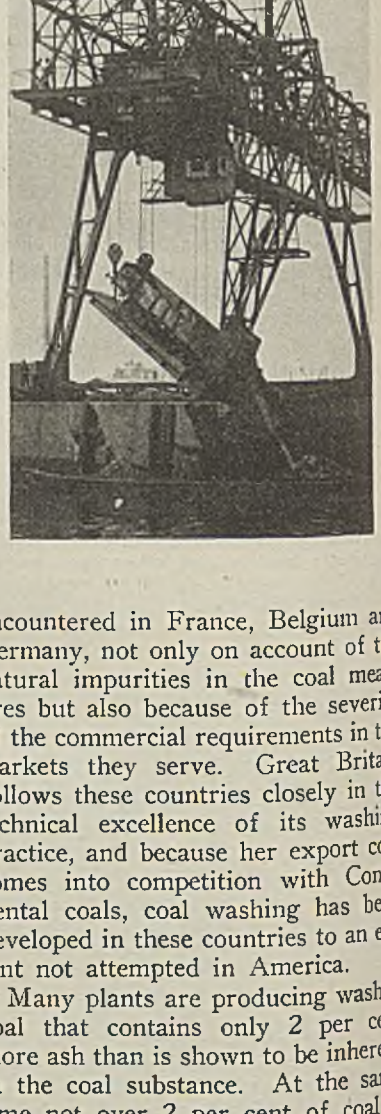
As in the past, Coal Age *will have adequate staff representation at Cincinnati so that the June Issue may bring to the reader a complete story of the major developments brought out in the addresses and discussions at the convention sessions and a picture of the improvements in equipment mirrored in the exhibits at the machinery exposition.*

THERE is every reason why mines should be as thoroughly mechanized as can be done with due regard to the safety of the mines and of the mine workers, but in many, if not in most, of the intensive mechanization schemes not only of the past and present but also as projected for the future, safety has been the last rather than the first consideration. Many mines have conditions as to gas and dust and others have conditions as to excessive moisture which make electrical installations of any kind at or near faces dangerous in the extreme. A return to the use of compressed air may well be given consideration in mechanizing gassy or dusty face regions, even though costs and flexibility with compressed air will be by no means as favorable as with electricity.

While the main underlying factor in the intensive mechanization of mines now under way has been reduction in costs, it is entirely probable that if safety is taken into consideration to anything like the extent that it should be, costs will be lowered little if at all. Notwithstanding this, the mechanization process will and should proceed. If coal-production costs should ultimately increase, they should be passed to the public, where they belong, rather than decreased by attempting to operate mines at lessened costs brought about largely by unsafe practices.

THE THOUGHT OF EUROPE

As It Bears on Our Problems



By James H. Pierce
Member, Stuart, James & Cooke, Inc.
New York City

DURING the past several years the extreme depression of the coal business has forced the American coal producer to seek means of recouping lost markets and to devise methods of reducing operating costs or of increasing sales realization or both, in order to protect his investment. In this study many European developments are proving interesting. The American engineer is finding that many of the problems now confronting him already have been encountered and solved abroad.

The most pressing technical problem in America today probably is to determine what type of washing equipment should be installed. There are as many diverse opinions on this subject as there are types of washers. Probably the next most ardently discussed questions are whether room-and-pillar or long-face workings will yield the lower cost, and which type of loading machines is best suited to application to either of the adopted systems.

The third important matter under discussion is the best manner in which coal may be submitted to a regulated temperature distillation and thus be converted into other products, the sum total of which will yield a higher dollar value than the original coal.

A fourth matter receiving close study is the consolidation of either operating or sales units so that the supply of coal may be better regulated and administration costs reduced.

It has been my privilege to see many of the important mines in America, in Great Britain and on the Continent, to ascertain how the mining men in different countries are meeting the problems mentioned, and to gage the trend of the latest thought in the several countries. For obvious reasons, no attempt will be made to point out the merits of one solution or another. I shall confine myself entirely to indicating the trend in regard to the four matters just mentioned.

(1) Coal Washing.—Probably the most difficult washing problems are encountered in France, Belgium an Germany, not only on account of th natural impurities in the coal meas ures but also because of the severit of the commercial requirements in th markets they serve. Great Britai follows these countries closely in th technical excellence of its washin practice, and because her export coa comes into competition with Cont nental coals, coal washing has bee developed in these countries to an ex tent not attempted in America.

Many plants are producing washe coal that contains only 2 per cen more ash than is shown to be inheren in the coal substance. At the sam time not over 2 per cent of coal lost in the refuse. The results at suc plants should give an indication o what constitutes good washing prac tice. Hence, it is significant that a present wet washing greatly predom nates. In Great Britain and Ge many the Simon-Carves, or Baum process is most highly regarde whereas in France and Belgium mo Rhéolaveur and Coppée washeries a to be found. All these processes a good, the process chosen usually b ing determined by exhaustive tests o the particular coal to be cleaned an by studies as to the comparative i stallation cost of each system.

Both the Simon-Carves and Rhé laveur processes have already been i troduced satisfactorily into Americ

Europe, says Mr. Pierce, favors longwall mainly because her coal is thin. Some companies use both longwall and room and pillar, the first in coal over 4 ft. thick and the second in coal below that thickness. The winters in America being severer than in Great Britain and Continental Europe, water is more objectionable in the cleaning of American coal.

and are available for detailed study. Dry cleaning probably is receiving more serious consideration in America than in Europe, although Great Britain is installing a great many air plants.

AIR cleaning will find more favor, I believe, in America than in Europe because the cold climate here tends to freeze wet-washed fines, because customers demand wet-washed weight allowances and because mine managers do not insist on as low an ash content in the coal or as low a coal content in the refuse bank as is common in European practice. There is no question in my mind that air cleaning in its present state does not begin to give the results attained with wet washing, and will not until the same principle of hindered settling which has made wet washing a success is worked out for and applied to air cleaning.

On the other hand, air cleaning has come to stay; it will find favor in cold climates, in plants using the fine coals for their coke ovens, where the moisture content of wet-washed coal is objectionable, and in plants where the dust extracted from the air tables may be used in powdered-fuel boilers. In view of these conditions I predict that the logical development of the next few years will be toward combination plants using wet washers on material ranging probably from 4-in. mesh down to $\frac{1}{8}$-in., and dry washing of the fines, and that each of the companies marketing one process or the other will be forced to recognize the merits of the competing process and cater to the individual preference of the prospective client.

James H. Pierce

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(2) Room and Pillar vs. Long-Face Mining.—The divergent opinions among American mining men as to the respective merits of each system have been aired in the technical press to such an extent as to confuse the average mind. Certainly on paper long-face operations appear attractive, but in actual practice we find in America a predominating opinion in favor of room-and-pillar operations. In Europe long-face work is almost universal and room-and-pillar workings are indeed rare. What, then, are the conditions that determine which system is best, and from these conditions can we forecast the future trend of development?

In Europe mines are deep and gaseous and have universally bad roof. The grades usually are such that cars cannot be delivered at the face. The capital investment will range from $5 to $8 per ton of annual output, and in consequence all the coal should be recovered. The layers of coal usually are less than 3 ft. thick and all the above conditions permit of no other choice but long-face or longwall development.

It has been interesting to find some European mines where both systems are in use, and in each case I have found the room-and-pillar costs lower than those of long face. This is due largely to the excessive face timbering and haulage-road maintenance costs under the long-face system. In one particularly well-managed mine where this condition obtained the management has determined that, generally speaking, when the coal thickens to 4 ft. cheaper coal can be obtained by the room-and-pillar system than by any other, but in this mine grades are comparable with those in the generality of our bituminous mines and many other conditions are similar.

IN SPITE of present preference I look for a decided increase in long-face mining in America, particularly in seams less than 4 ft. thick, and no doubt it will be brought about largely by the mechanization program now in progress. Roof control will soon

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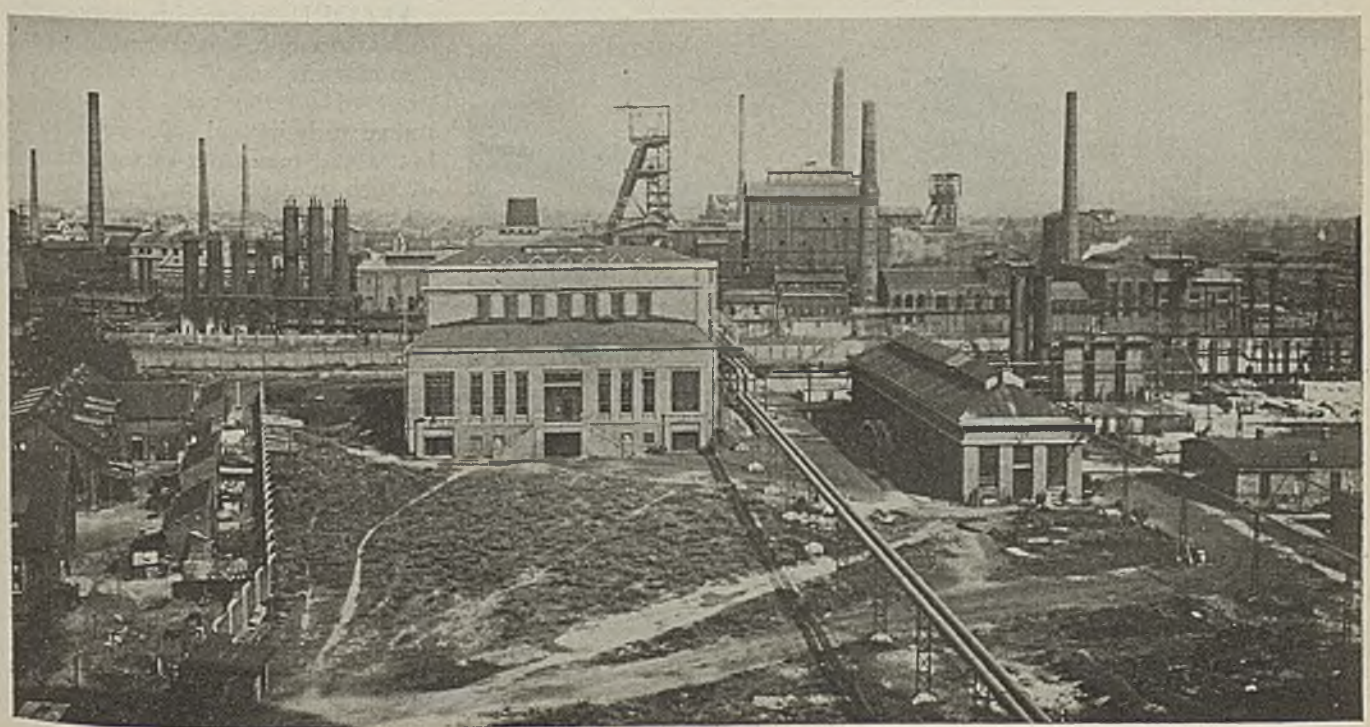
Mathias Stinnes Colliery, One of the Progressive Plants of Germany



be so greatly developed that loading machines can work with safety on long faces, and this will permit machines to load into conveyors. Again the use of steel props in both America and Europe, by decreasing the timbering costs on long-face work, will help to make that type of operation preferable. In thicker seams with bad drawslate, such as is found in the Pittsburgh district, progress in long-wall naturally will be slow.

(3) Distillation of Coal.—This has been quite common in Europe for many years, and is now becoming of absorbing interest to companies in America which have coking coals. Much research work is being done abroad to determine the merits of both high- and low-temperature distillation. Irrespective of the process adopted, there can be no doubt that this is the next major step toward which the American coal industry is headed, and it will have a far-reaching effect.

The capital required to build large distillation plants will automatically place the coking-coal areas in the hands of strong financial groups and tend to eliminate the small mine owner. It is entirely possible that the favorably located coal mines will be absorbed by the large metropolitan gas companies. This development will be helpful to the entire coal industry.

America has been wasteful of its high-grade coals. In such splendid fields as those underlaid by the Pocahontas and the Pittsburgh seams mining systems have been permitted which gave a low percentage of recovery. Again thousands of beehive ovens have been for years wasting valuable heat, power and byproducts; the exhaustion of these fine fields is not far in the future. It is imperative that they gravitate to strong financial groups who will conserve them as long as possible; otherwise inferior coals will soon have to be mined with a consequent increase in the cost of power.

(4) Consolidations.—The financial statements of a large number of consolidations in various industries disclose the fact that they have failed to make the anticipated savings. Consolidation or a mere increase in the size of a company does not therefore assure better results; frequently it results in lower operating efficiency. A consolidation, to be effective, must be based on sound economic reasons. Where properties can be physically consolidated and working personnel and supervision can be reduced, the savings are self-evident. Where consolidations are effected that can control the selling price of a particular grade of coal, the elements of a successful consolidation are apparent.

IN AMERICA, physical consolidations of operating properties, while extremely desirable, are today accomplished only with difficulty. The coal business is in such financial distress that bankers, unless they already have much of their own money involved, hesitate to provide the necessary money to effect physical consolidations, even though the estimated savings appear attractive. This forces the mine owner himself to negotiate with his neighbor with whom he would like to consolidate, and almost immediately negotiations break down due to their different views of the value of their respective properties or perhaps due to the desire of some individual to manage the consolidated property.

Slow progress in this respect may therefore be anticipated in the consolidation of mines already under a common ownership. The tendency probably will be toward a consolidation of selling companies to control the product of a definite district. In Europe this is already in effect, and the cartels, as they are termed, cover not only a single country but control output and prices from several countries and allot available business to these countries and to individual firms within each country on the basis of a pre-arranged schedule.

In Great Britain, which has suffered most heavily from the world's coal depression, this scheme can be found operating. A "five counties scheme" has been adopted which provides for the control of output on a quota system, and for subsidizing exports out of a fund derived from a levy of 6c. per ton on all coal produced. The various mine owners in this combination are now being asked to approve price fixing for the various classes of coal and a method of pooling unused quotas and their sale by the association.

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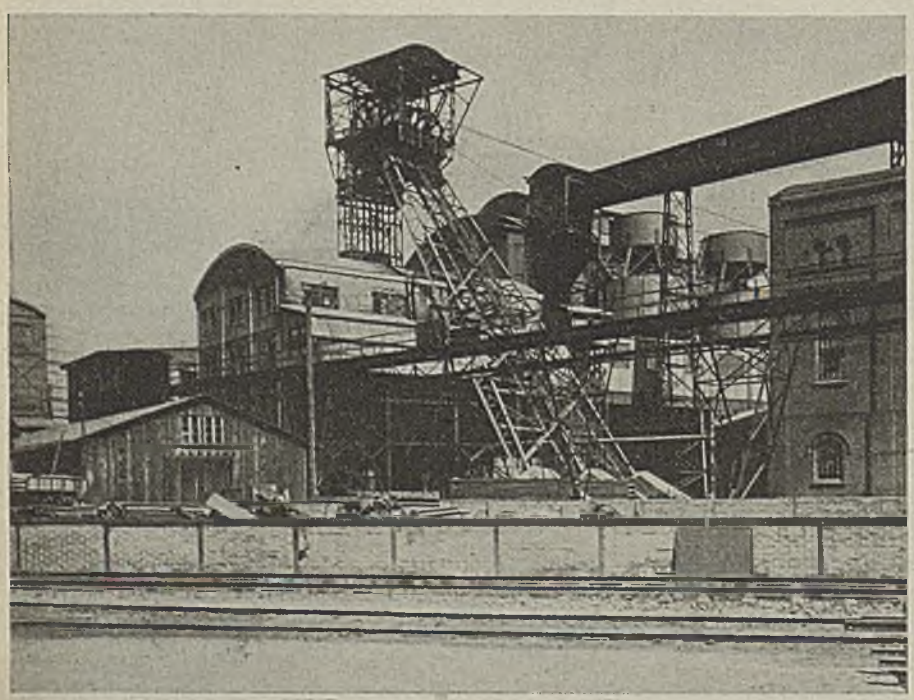
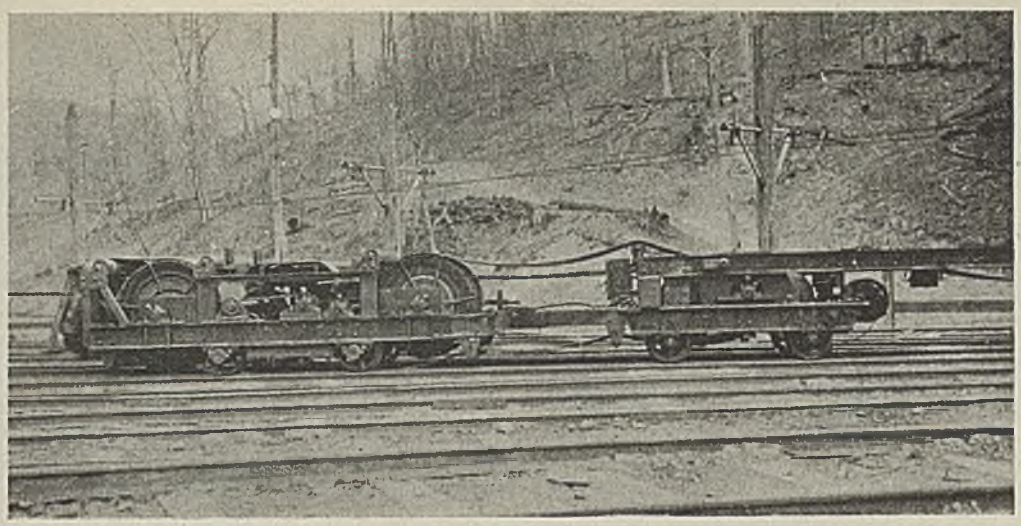
Shaft No. 2, Mathias Stinnes Colliery With Its Coal Washing Plant



ACCORDING to this proposal the association would control all the participating members in fixing the price of all the coal they are permitted to hoist and sell. Each member would retain out of the proceeds of such sales not a uniform price for all members but one applicable to his own coal based on past experience, so that each member would preserve an existing relation of price as compared with all other members. Such combinations as outlined may grow to such an extent that they may seriously hinder the future expansion of America's export and bunker-coal business.

In a future article I propose to deal with individual plants in several different countries so that the operating official can see the type of construction used abroad, the kind of machinery preferred, and anything of unusual interest that pertains to the individual colliery discussed.



Ready to Enter the Mine for the First Trial

And Now a 300-Ft. Belt Conveyor Flits From Room to Room Like Mining and Loading Machines

SEVERAL years ago belt conveyors with idlers supported from mine posts proved their efficiency for the transportation of coal in rooms, but only a few were used because each room had to be provided with a complete conveyor and the cost was prohibitive. Now a movable room conveyor of the belt type is being given an initial trial in a difficult section of the Nellis (W. Va.) mine of the American Rolling Mill Co.

The machine consists of two truck-mounted units. The one on which the belt reels are carried, and which has a propelling motor, is termed the "reeling and propelling unit," and the other, the "belt-driving and delivery-end unit." Both units remain coupled at all times. Mine tracks are required in rooms where the machine is used. The combined weight of the units when carrying the belt for a 300-ft. room is approximately 6 tons.

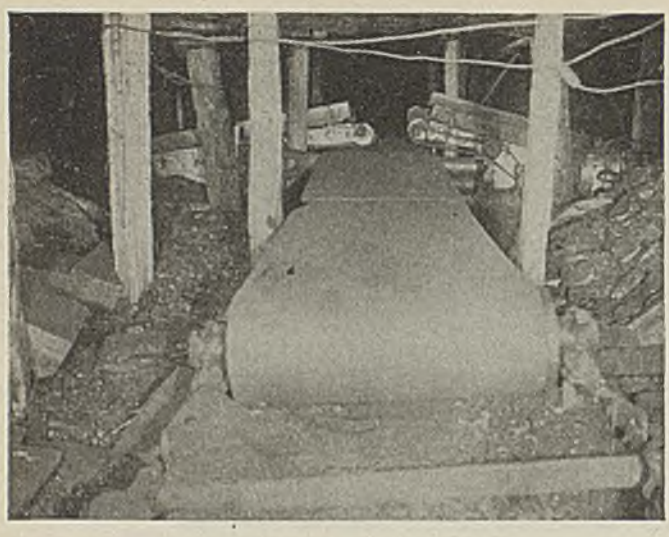
The reeling and propelling unit carries a skid-mounted tail pulley which during operation is detached and anchored to form the receiving end of the conveyor. A unique feature of the machine is that the idlers or rollers which support the upper and lower runs of the belt are so arranged that they can be swung to one side and clear of the track when the conveyor is taken out of the room. The tail pulley is supported by ½-in. manila-rope blocks from the roof jacks which serve as an anchor.

IN DRIVING rooms the sequence of the moving is as follows: When a cut has been loaded out the belt is stopped so that one of its splices is above the center of the reeling and propelling unit. Then the tail pulley is unhooked and the belt uncoupled by pulling out a pin in a quick fastener at the aforementioned splice. Each one of the free ends is then coupled to the pieces of belting remaining on the two reels.

As these reels are revolved by power in opposite directions, the tail pulley and its skid are dragged along the track to the room neck. Progressively the idlers are swung back out of the way. After the tail pulley has been drawn up against the end of the reeling and propelling unit, both units

* * *

The Two Units in Operating Position in the Room Neck



Tail Pulley and Face Conveyor in Place

* * *

are ready to move along the track under their own power to the next room.

There both go to the far end of the room, where the tail pulley is dropped and anchored. As the units travel back to the room neck and the belt is paid out from the reels the idlers are swung back into operating position, each one in sequence just back of the machine as it is moved along. By this method the rollers are swung under the belt before it falls to the floor, thus making it unnecessary to lift it up from the mine bottom after the belt is extended. Each of the two or more rooms in which the conveyor is to be used must be equipped with posts and rollers.

EACH unit of the machine is equipped with a 7½-hp. motor, and the belt reels carry 600 ft. of 30-in. 4-ply rubber belt. The height of the units is but 37 in., therefore when light rail and steel ties are used the machine can run back and set its tail pulley in a room where the minimum height is 40 in.

The conveyor was designed for carrying 80 tons per hour over grades up to 18 deg., and for a moving time of 30 minutes from one room to the other. The conveying speed of the belt is 200 ft. per minute.

The initial trial is being conducted in a room where two 40-ft. faces, one on each side of the conveyor, are being mined retreating. The faces had been brought back about 75 ft. when the photographs were taken from which the illustrations that accompany this article have been made. Two Gellatly mat face conveyors were being used to deliver coal to the belt conveyor. The first part of the mining was on an upgrade of 12 to 14 deg. because of a roll in the seam that reduced the working height almost to the minimum for which the machine is designed.

* * *

At the Delivery End the Coal Rides Over the Top of the Machine

BY OPERATING the belt in the reverse direction all timber and other materials required at the faces can be transported to the face. As mining progresses by the removal of the proper section of the belt the conveyor is shortened by 7-, 14-, or 21-ft. steps. This is taken out at the reeling and propelling unit and is wrapped onto the reel by power.

Looking Back at the Receiving End—Mining Machine at Left, Face Conveyors in Center Background, and Hinge of Roller Frame at Right

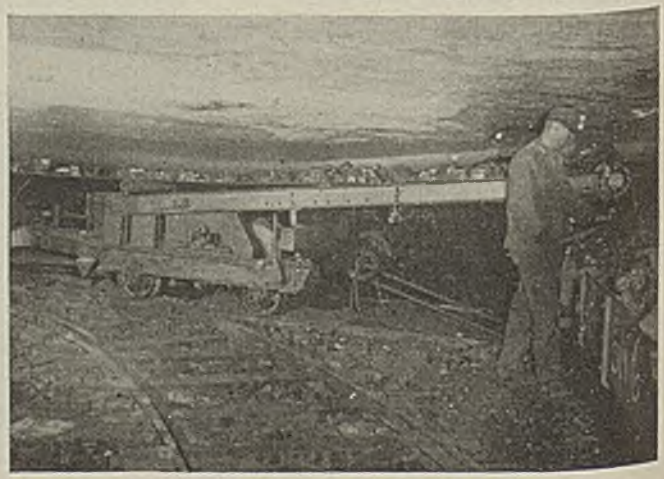
* * *

In the illustration it will be noted that flat instead of troughing rollers are used. This arrangement greatly simplifies the construction, and inasmuch as the load carried is small for a 30-in. belt, spillage is not a factor. The trial operation has demonstrated that under normal conditions a small piece of coal loaded onto the very edge of the belt will not fall off.

The machine was developed and patented by Cadwalader Jones, formerly vice-president and general manager of the By-Products Coal Co., and was built by the Industrial Brown Hoist Corporation. It is Mr. Jones' idea that the machine also can be utilized with mechanical loading to solve the problem of taking coal away from the loader continuously and loading complete trips instead of single cars.

* * *

Loading a Trip on the Entry



Both Buys and Sells

By Test

IN THE early days of the coal-mining industry brilliant guesses as to what to use around the mines and how to use it were expected of managers and superintendents. The question, "Shall we use malleable iron or cast steel for our mine cars?" for instance, would have been answered promptly without investigation or experiment. Today the manager replies, "I don't know, but we'll find out."

The Lehigh Coal & Navigation Co. at Lansford, Pa., has a department that answers just such questions as its daily routine duty. Not that the answer is returned in a day; far from it. The answer comes, when it does come, out of tabulations of records, out of careful inquiries and experiments. Even the question whether to use a copper-alloy steel or ordinary carbon steel for car irons is one that the department of research under its director, J. S. Miller, will take under definite advisement.

Some companies have called such a department a standardization bureau, but there is a disadvantage in emphasizing standards which are the natural outcome of research rather than research which is the only proper basis for standards. In practice both are likely to be conducted together. The standards are formulated tentatively and adopted partially until the research department has gone far enough in its investigations to declare its definite opinion. Thereafter the standard becomes the fixed rule, and efforts are made to bring whatever does not conform with the standards up to their requirements.

The definite founding of this department occurred about four years ago. One of the important phases of the work from the start was the maintenance of a system of records that would enable the department to know definitely the life of every important part of every machine—its accident record, in short. Such records have long been made with regard to safety to life and limb and have been found extremely valuable in reducing accidents in all cases where the statistics were carefully tabulated and studied and their indications made a basis for improved methods of operation. But records have a definite advantage when dealing with inanimate things, because it may be possible in many cases to reduce the strain on the part or replace the latter with better material, whereas when an accident to life occurs one cannot replace the man with a more resistant unit but can at best only remove some of the danger to which the man might be exposed.

THESE records are still in an early stage but are beginning to bear fruit. Thus it has been found that in some places in the mine timber will last only six months in its natural state and that when treated it has lasted already three years. It is proved, therefore, that the treatment of timber pays in such places when it has to have a life of much more than six months, but it is not yet clear just what preservative of the many on the market should be used, whether Woolman salts, Aczol, zinc chloride or silicon fluoride, all of which have been tried already and been found helpful. Tests also will be made of the Curtin-Howe process with dimensional lumber.

The life of jig parts, screen plates and chutes has been studied. One of the inquiries being made is into the use of manganese steel for car wheels. There is much wear and tear on the wheels where the service is severe, as on long planes. The company uses a big car, 5 ft. 2 in. above the rail and weighing 5,400 lb. and carrying 4 to 4½ gross tons, and though the wheel is of 20 in. diameter the tread is subjected to unusually hard working conditions.

Some inquiries have been made as to shooting methods, with the result that a better insulated shooting cable is being introduced. The formulation of a system of shooting has not been easy. It is found that not only do the seams vary in hardness but the same seam varies from mine to mine. The Primrose seam in some cases mines itself, but in others, as in the mines where it is known as the "Vertical seam," it requires at least as much powder as the average run of anthracite. Many companies have had trouble with batteries. One of the duties of the bureau is to find the safest, the surest and the best on the market so as to make shotfiring less hazardous.

So much for the ascertainment of data by records made of the accomplishment on the job, without which much valuable information is thrown away though it may be obtained at low cost. Record should now be made of the fact that the Lehigh Coal & Navigation Co. is making two other kinds of tests—tests of its product under operation and specificational tests. The former is the most unusual of all the tasks presented to the research department. Its purpose is to determine how the coals of the Lehigh Coal & Navigation Co. best can be burned in the various household furnaces on the market. The service men of the company have come with their problems to the department of research.

THAT organization has three steam furnaces, one hot-water furnace and one superheater in which to make experiments. It is making tests to determine the action of the coals from the various mines when these furnaces are run at various ratings under different direct and induced drafts. The clinkering of the ash is studied with intermittent and continuous draft. The efficiency at different rates of burning is determined.

Quite generally, a service man is called in from the field to aid in the determinations and to derive from the work a more intimate knowledge of what the particular boiler can effect when operating on the coal of the company. It is felt that no combustion engineer can really prognosticate how a given coal will act from tests made on an entirely different coal. There have been experiments made along these same lines, but the Lehigh Coal & Navigation Co. wants an intimate knowledge, not of coal in general but of the fuel it ships.

As a result of its experiments the research department has developed the "crater method" of firing a coal furnace, in which the coal is heaped against the walls of the pot, leaving a low center which is level with the bottom of the feed door. The easiest

passage of draft through the fire bed naturally is along the walls; hence, by carrying the fire higher at the side walls, the passage of air is retarded and a uniform draft maintained through the fire bed. In this manner a large body of heat is kept in close contact with the water or air to be heated. A booklet has been published entitled "How to Get the Most Out of Old Company's Lehigh Anthracite.".

The company maintains a testing laboratory which among other duties makes analyses of samples of coal. It has been found, however, that a test based on specific gravity gives the percentage of ash with great certainty provided there is no marked change in the character of the coal. This method of finding the percentage of ash is known as "the routine method" and it is made at the collieries to check up on the coal quality.

Samples are sent to the laboratory at frequent intervals, however, so that a check can be kept on the routine method of analysis. It may be found after a while that a new curve should be made connecting specific gravity with ash percentage, but the changes are slight and not rapid. The muffle used for ascertaining the ash content of the coal is of F. J. Ryan construction and is an adaptation of the heat-treating furnace. It is kept at 1,400 deg. F. by a thermostatic control operated by a pyrometer. Cement- and asphalt-testing equipment is provided, the latter being used for study of the asphalt formerly used as a binder in the Lansford briquet factory, which has been discontinued. An oil-heated furnace also has been provided for the testing of coal briquets with various types of binder.

A Riehlé tension machine with a capacity for exerting a pull or push of 100,000 lb. is used for determining the strength of metals. A gas-analysis equipment is provided for ascertaining the character of mine atmospheres. In addition, there is a well-equipped chemical laboratory with three balances. The grinding shop is housed in a separate building. It has a crusher, disk mill, automatically controlled drier and a rattler for testing briquets and paving rock. The coal is ground to minus 40, this being sufficient for the regular routine of ash tests.

Tests are made of all supplies received, such as oils, greases, paints, belting, iron and steel. Thus the company watches both its product and the materials which it purchases for obtaining the product. The operation of these mines therefore is based on scientific data and not on whims and guesses or improvisations, however brilliant.

Condensate From Mine Plant Supplies Town With Water

PURE water for domestic supply is a great help in holding a good class of citizens in a mining town. Not only should the water be free of harmful germs; it should be free of chemicals or compounds which cause red sludge and should be soft enough to wash clothes nicely. The ultimate in regard to these characteristics is attained in the water supply at Stearns, Ky., by using condensate from the mine power plant.

This town is the main village of the Stearns Coal & Lumber Co. in McCreary County. The power plant, which is located beside the log pond of a large sawmill operated by the company, supplies power for the production of 1,000,000 tons of coal per year from the seven mines of the company and for the sawing of 20,000,000 b.ft. of lumber per year. In addition it supplies energy for lighting the company towns and two independent towns. Energy also is sold to a neighboring mine.

It was in 1917 that the utilization of condensate for domestic supply was started. From then until May, 1928 this water came from the surface condenser of a 1,000-kw. turbine which together with an engine-driven a.-c. generator made up the plant capacity. Since May, 1928, the condensate has been supplied principally from the surface condenser of a 2,000-kw. turbine put in then.

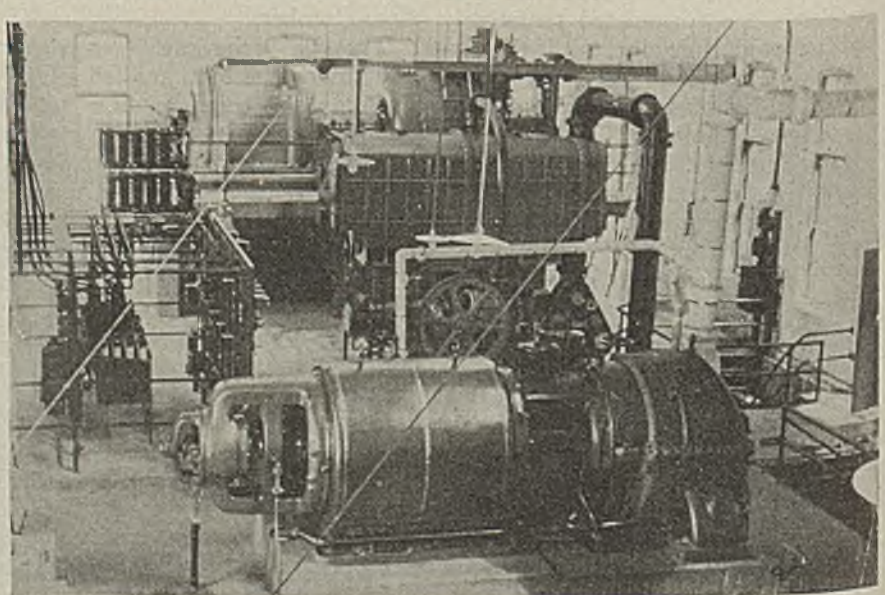
Of the 50,000 gallons or so condensed in 24 hours 40,000 to 45,000 is used by the town water system. The remainder makes up a part of the boiler feed, which consists principally of surface water from the mill pond. C. L. Larmee, master mechanic, explained that the use of the condensate for domestic supply has a definite cost just as would the operation of a filtering and treating plant.

The use of a large percentage of raw water instead of condensate for boiler feed causes more rapid accumulation of scale in the boiler tubes. On the average the tubes are drilled once a month, and the scale accumulation removed is about $\frac{1}{32}$ in. The increased cost of boiler maintenance due to the heavy use of raw water is approximately $10 per day.

In order to keep within the supply of condensate certain restrictions had to be placed upon the use of water; for instance, its use for watering lawns is prohibited.

The condensate is pumped directly to the domestic supply mains without aëration. To those accustomed to its use the characteristic flat taste of distilled water is not noticeable. Visitors usually fail to notice the difference unless it is called to their attention.

In the Background Is the 2,000-Kw. Turbine and Just in Front of It Is the Surface Condenser

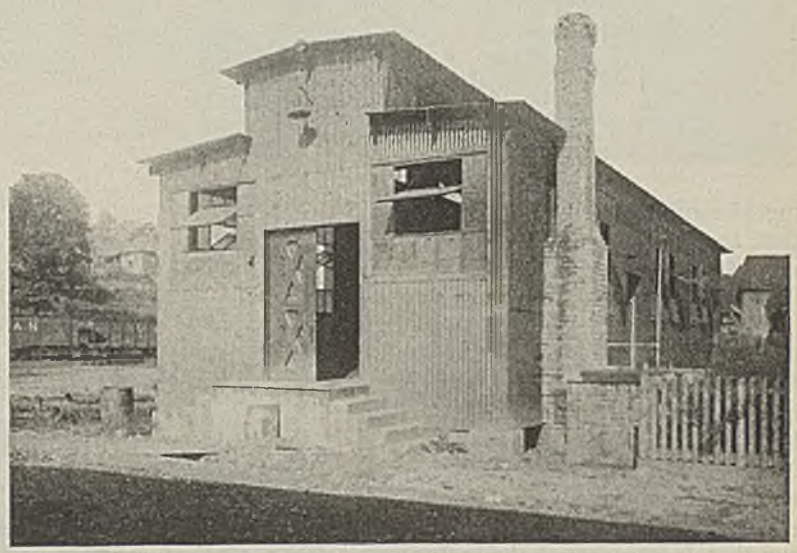


Greater Efficiency . . .

. . . Lower Power Costs

Achieved at New River Central Machine Shop

By J. H. Edwards
Associate Editor, Coal Age

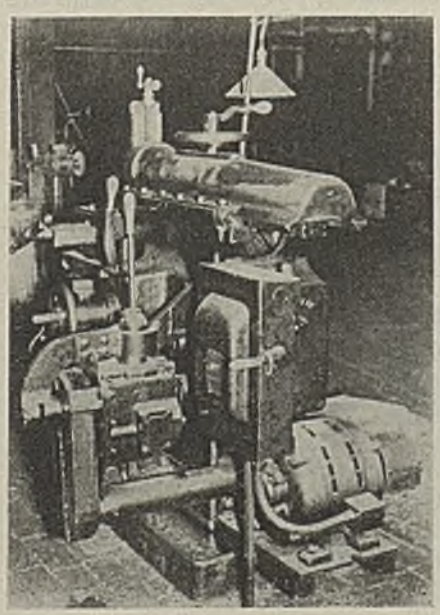


New River Co. Foundry

RECENTLY completed changes in the equipment of the central machine shop of the New River Co., Macdonald, W. Va., in the interest of power conservation, added convenience and effective operation make it one of the most modern in the Southern bituminous fields. When originally constructed, in 1921, much of the equipment was moved from a shop at one of the mines and the original line-shaft drives were continued, though a wheel lathe and other new equipment purchased at that time were equipped with individual drives. Two years ago a brass foundry was added and last year all the original line-shaft drives were converted to individual, making the shop thoroughly modern in all particulars.

This shop serves the fourteen active mines of the company, located in Fayette and Raleigh counties. All are accessible by hard road, the farthest being 14 miles from the shop, which means approximately one-half hour delivery service by truck. Conditions controlling or affecting the quantity of mining equipment and its duty, and therefore the amount of shop work required, are as follows: This coming year the New River Co. will produce 3,000,000 tons or more, all from the Sewell seam, which averages 3 ft. 10 in. in thickness and contains rolls which present difficult grades for locomotive gathering and haulage. Six of the mines are shaft, two are slope, and six are drift. The haulage and cutting equipment includes 154 locomotives and 80 short-wall undercutters.

Automobile Gear Shift on a Shaper



The shop building is 90 ft. wide and 120 ft. long and consists of three bays each 30 ft. wide. The center one is equipped with a 10-ton floor-controlled bridge crane and each side bay with manually operated cranes also of the same type. Along the sides in one end of the center bay are located the heavy machine tools. The other end of the same bay is allotted to overhauling of complete mine locomotives, cutting machines, hoisting cages and so on.

The shop office is in a corner of the building diagonally opposite the blacksmith forges. Next to the office, but not partitioned off from the rest of the shop, is the armature-winding department. A floor space 30 ft. x 45 ft. is allotted to this work and to armature storage. A count of the armatures at the time the accompanying photographs were made indicated 90 repaired armatures in storage and 20 armatures undergoing repairs.

Conversion of the shop equipment to individual drives was effected without purchase of an appreciable amount of new equipment, as an accumulation of extra a.c. motors of small sizes was put into use. In order to obtain several speeds with the new drives, and do this by utiliz-

Making "Cabbages" in the Foundry

ing the old cone pulleys, several of the machines were converted by mounting a motor and jack shaft overhead near the old cone pulley countershaft. The motor and jack shaft are mounted, or rather hung, from a unit base and are mechanically connected by a silent chain housed in an oil-tight case.

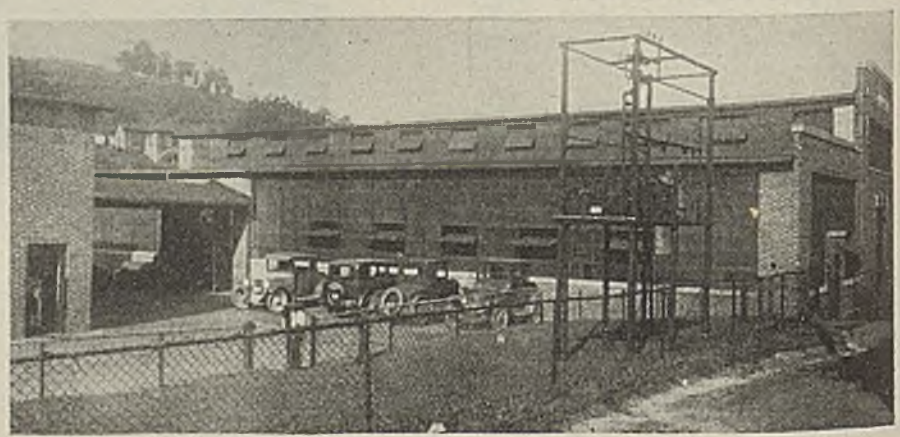
On other machines sliding-gear transmissions removed from automobiles were used to obtain the three speeds. In these cases the motors are mounted on brackets attached to the machines, and silent chains used between the motors and gear-shift boxes. A one-half horsepower motor was connected to the grindstone by means of a worm reducer made from a worm and worm wheel recovered from some unused equipment.

The principal objection to the old group drives was that the large motors and long line shafts often had to be kept running at night just to operate a few small machines used on an overtime job. Another objection was the nuisance of applying belts to machines, such as the pipe threader, which are used but infrequently.

Addition of a foundry to the central shop equipment was prompted by frequent emergency needs for special brass bushings. Later the activities were extended and now practically all of the requirements for bushings, pump plungers, trolley wheels, pole heads and harps are being filled by the foundry. The foundry building is 20x40 ft. This allows ample extra space for storage of patterns and cores and for the scrap copper and other metal that is used. The output of brass and bronze castings runs about 5,000 lb. per month. The melting equipment consists of a Monarch kerosene furnace and 40- and 60-lb. graphite crucibles.

As a rule the bearing bushings are made from a mixture of one-half new metal and one-half scrap brass. Trolley wheels, pole heads, harps and pump plungers are made from new metal mixed 90 per cent copper and 10 per cent tin. Journal boxes for type 803 locomotives are cast of manganese bronze. These boxes do not wear the locomotive frames like the original cast-steel or cast-iron boxes and, morover, they are designed so as to prevent troublesome turning of the bushings.

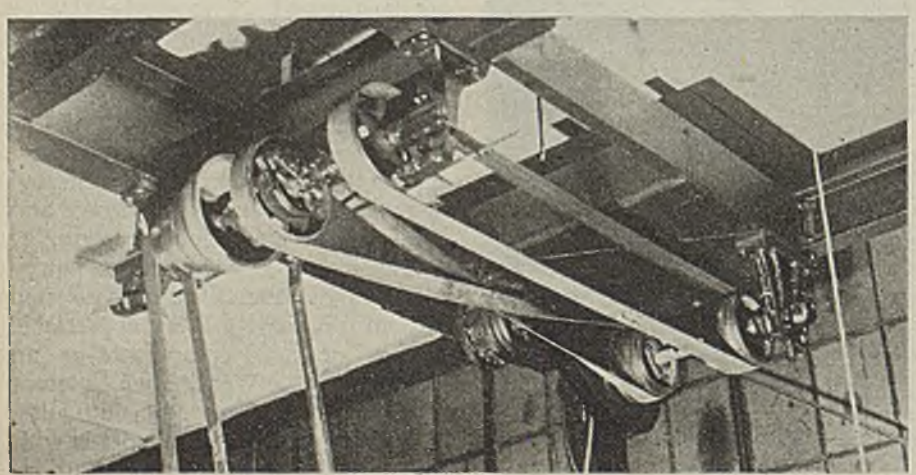
All of the copper scrap from the winding department is used in the foundry. The helper bales this scrap wire, from which the insulation has been burned, into "cabbages" averaging 20 lb. each. This is a convenient size for charging into the crucibles. The baling is accomplished by pounding the wire into a short steel tube in which tie wires have first been placed. The bales are about the size of medium cabbage heads.



Side View of Shop; a Rear Corner of the Warehouse Shows at the Left

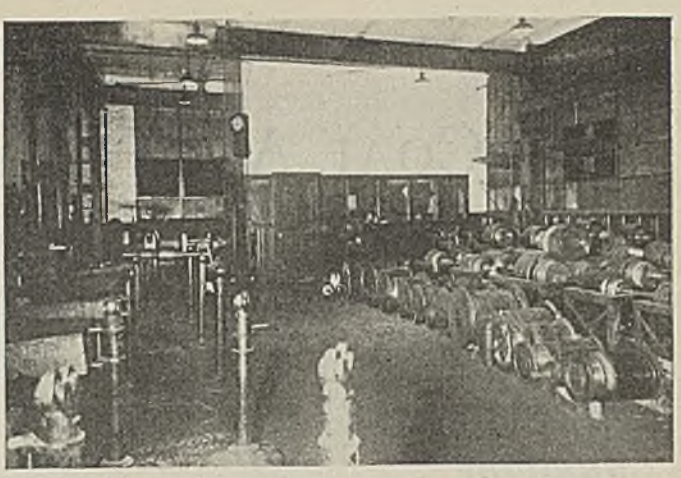
Although the shop is operated on a system whereby each man must charge his time to the individual jobs worked upon each day, complicated methods are eliminated as far as possible. As an example, instead of furnishing machinists with dimension drawings showing the proper finishing for brass castings, a sample of each of the common types is kept in the tool room. This reduces the chance of mistakes in machining and saves the expense of preparing drawings.

It is the truck driver's duty to attach to each piece of equipment unloaded at the shop a brass tag indicating the mine from which it came.



Individual Drive Using the Original Cone Pulley

Machine Tool End of the Center Bay



Winding Department With Shop Office in Background

Also, he leaves with the shop clerk a list of the items unloaded. The clerk then assigns a number to each job and attaches two cloth tags bearing the number. When the job is completed the workman removes one tag and turns it in to the office with his time card.

CONTINUOUS supervision for the tool room is managed at small expense by providing space therein for making controller and resistance repairs. The man assigned to this work also dispenses and receives tools by brass check.

In addition to C. R. Heermans, superintendent of the shop, the force consists of 33 men. These are engaged as follows: 2 mechanics who regularly go out to the mines when needed; 5 machinists; 6 armature winders; 3 electricians who overhaul stationary motors, locomotives, mining machines, and so on; 3 blacksmiths who rebuild hoisting cages and do general smithing work; 3 welders using the electric and acetylene processes; 1 molder; 1 molder helper; 1 janitor; 8 shop helpers and 1 clerk.

Most of the men live in Macdonald or Mt. Hope, so close to the shop that they go home to lunch. The mechanics have been "made on the job," so there is practically no labor turnover. It is the policy to try to maintain the same size force regardless of ordinary fluctuations in coal production. When there is a rush of urgent work general overhauling jobs are put off, and when regular work slackens overhauling and rebuilding is carried on.

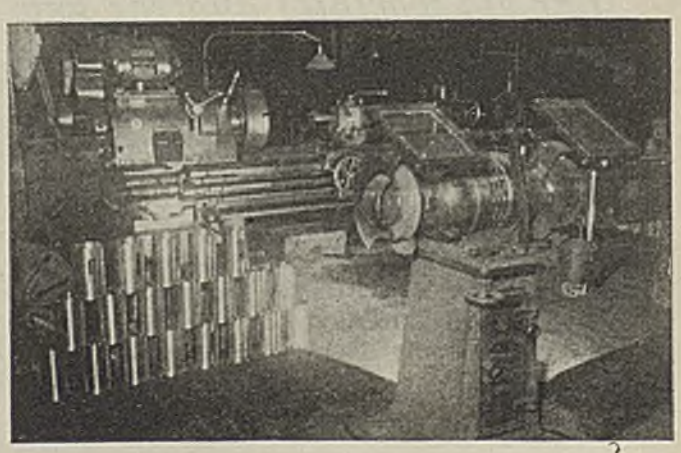
Methods in the shop are closely in line with what is generally considered good practice today. Coils for electrical winding are purchased instead of being made at the shop. The treated type is specified for all equipment that can be so wound. Dipping and baking is the practice for all armatures wound with soft coils and for armatures used in mining machines and pump motors.

The baking oven is electrically heated and is automatically maintained at 212 deg. F. An a.c. magnet or bug is used on all armatures, and an insulation test of 1,000 volts higher than the rated voltage is applied. Many of the armatures are from 500-volt equipment. These are tested with as high as 2,200 volts.

Electric welding is applied in a wide variety of repair jobs, including the building up of worn locomotive axles, but is not used for filling worn tires. This was tried but the practice failed to show an appreciable saving. Tires are turned once, then scrapped after the second service. All locomotives are equipped with solid gears. Although application of this type of gear requires the removal of a wheel center, which results in a new fit at lower pressure, only one or two loose wheels are encountered per year.

Adjacent to the shop and connected thereto by a covered monorail crane track is a central warehouse the overall dimensions of which are 100x200 ft. A room 140 ft. long in the end next to the shop is used for mine supplies and the remainder of the space for commissary stock. In the same city block but separated by a large and well-kept lawn is an administration building which also houses offices of the mine operating department and of the White Oak Coal Co., the selling organization. This combination of office, warehouse and central shop in the same block is advantageous to each unit.

A Look Into the Foundry From the Doorway



Glass Shielded Emery Wheel in Foreground; in Background, Journal Brasses and New 23-In. Heavy-Duty Engine Lathe With Turret Head on Which Brasses Are Machined

COAL AGE

Published by McGraw-Hill Publishing Company, Inc.

SYDNEY A. HALE, *Managing Editor*

NEW YORK, MAY, 1929

Immunizing underground dumping

FINDINGS of the state-federal commission in the Kinloch disaster bring out sharply dangers existent in some of the country's mines where underground dumping in combination with skip-hoisting or slope conveying is the practice. Dumping below ground fits neatly into the plans for the big producing units, and few would suggest its abandonment. But, with the lessons of Kinloch before them, operators must face the issue of making mines employing such a system less dangerous.

Rock-dusting is but one of the agencies for reducing the coal-dust hazard. It will stop the propagation of a coal-dust explosion but it will not prevent a flareup that will destroy life before it is extinguished. An important need, therefore, is to prevent coal dust from being raised into the air and that can be accomplished by spraying water on the coal as it is cut and wetting down the piles at the face. Thus safety at the dump starts well within the mine where the explosive dust is loaded. That which makes the room faces safe helps also to protect the dump and its connecting passage to the surface.

Sprays must be installed over the underground coal dump; the bottom landing must be ventilated in gassy mines by a split from the intake; dump and car hauls must be actuated by air supplied by a compressor located on the surface, and rock-dust barriers should be provided above or beside the conveyor. Finally, signals and lighting systems should be heavily armored and so sheltered as to be out of reach of any disruptive agency.

The old worthies and the new

IN THE HISTORY of coal mining in the last half of the eighteenth and the early half of the nineteenth century what a remarkable group of men made their appearance, and of these perhaps only one, Sir Humphry Davy, was rated as a technical man! The rest got their training in the mines or brought to them ideas they had developed elsewhere. The very greatness of these men's achievements has worked the industry some harm, because it is thought that we need merely men of that type to solve our present-day problems.

The whole truth, however, is that at the time mentioned there was little technique of any kind and the real qualifications of Sir Humphry Davy to be regarded as a technical man was that he did not have any practical experience and had merely the spirit of research to aid him. So the history of that period teaches little or nothing.

Today, with all our technique there is room for the practical man, as is proved by the way they frequently come to the front. Experience and observation had given the old worthies a sort of degree of Bachelor of Science, but many of the operations in the mine have made such progress that today they would puzzle those earlier coal masters who worked their spells with the old equipment. In all departments, chemistry and mathematics have made good to such an extent that today they must be comprehended if problems are to be solved satisfactorily, and no one can have a full knowledge of any department of the coal-mining industry without extended and laborious study.

Selling modernization

THAT modernization means lower costs and greater profits is generally accepted as a fact even by many reluctant to act upon that premise. Seldom, if ever, however, has the relation of a modernization program to the balance sheet been given greater prominence than in the recent offering of $30,800,000 debenture bonds of the Philadelphia & Reading Coal & Iron Co. Part of the proceeds of the issue, it is announced, "will provide for the construction of two modern electrically operated centralized breakers, for the electrification of the mines tributary thereto and of other facilities."

During the six years ended Dec. 31, 1928, the company reported aggregate operating and other income, after allowances for depreciation and depletion, of $3,565,574. Had the improvement program recommended by the consulting engineers engaged by the company to study its operations been in effect, it is estimated that this income would have been increased to $30,665,574, and the average per annum from $594,262 to $5,110,929. It is largely on the basis of these figures that the stockholders of the Philadelphia & Reading Coal & Iron Corporation have exercised rights to subscribe for over $17,000,000 of the issue and the public is invited to participate.

Much has been said in recent years about the pronounced disinclination of financial institutions to underwrite coal securities. It is still true that the banks look coldly upon proposals to pour new money into development of virgin acreage, and the industry may rejoice at this coldness. But the present flotation of Reading Coal bonds, the offering earlier in the year of a $20,000,000 bond issue of Pittsburgh Coal Co. and other financing involving lesser sums prove that investment bankers will underwrite and the public will buy coal securities sold to further modernization.

To study wire rope

MACHINERY is being set up through the research committee of the American Society of Mechanical Engineers for a co-operative study of the properties and life of wire rope. Preliminary surveys indicate that the subject is one in which there is a wide field for correlation of existing scattered data and for the initiation of new studies which will be valuable alike to the manufacturer and the user. General engineering interest in the topic has been measurably intensified in recent weeks by breaking of one type of wire at the Mount Hope Bridge and the decision to replace such wires with cables of another type at the Ambassador Bridge, in Detroit.

The subject in all its phases is one of direct concern to the coal-mining industry. The conditions under which wire rope is used at the mines are unusually severe. Shock and acceleration stresses frequently are high. Corrosion is a factor of importance. Kinks often occur through improper handling. In many cases the safety of human life and limb hangs upon the rope. As time goes on, the employment of wire rope as a part of the equipment of the mining industry promises to expand. For these reasons, if no others, the interest of the mining industry in the research will be direct and vital. The decision of the A.S.M.E. committee to go ahead under the auspices of the society and the sponsorship of the Engineering Foundation, therefore, is both welcome and timely.

Just a little theory, please

SO FAR as has developed, the inquiries of the U. S. Bureau of Mines into roof falls have been so eminently practical, as also have been those of the Mines Bureau of Great Britain, that no great development can be expected from them. Of practical mining men the two countries have had no lack for many years. The mine inspectors have been practical men, and they have specialized on safety. It would puzzle the public to imagine that they have overlooked much that can be obtained in a practical way.

Nevertheless these practical men, while uncovering nothing particularly new, have succeeded in laying a renewed emphasis on old safety methods and so have justified their assignment to the inquiry. Surely, however, a development of technique should be expected from studies of this kind. It is time a draft be made on the laboratory as a source of renewed inspiration and that a little research work be done to direct and clarify field observation. Suppose, for instance, an inquiry were made into the expansion of rock and what effect it has in destroying roof and bottom. No one knows how much rock expands when exposed for the first time to the mine atmosphere. Perhaps some of it does not swell much. Coal has been found to expand as much as 2 per cent. Some lignites and sub-bituminous coals probably expand much more. Sometimes these substances are allowed to act as the roof of rooms and headings and sometimes fragments of ancient vegetation form a large part of the roof content. In such case a swelling coal might do much damage. Frequently, however, rock swells more than coal. At some mines in New Mexico the expansion is almost unbelievably great and has dire results. But the public as yet has not received any definite figures regarding the degree of swelling there or elsewhere.

The expansion between two solid ribs causes the roof to bulge down and the floor to bulge up. In this connection, be it noted, the degree of sagging and heaving is much greater than the actual swelling. An expansion of 2½ in. in the width of a 10-ft. working place will cause a sag or heave of about a foot, yet 2½ in. in 10 ft. is only 2 per cent. When the rock is thus sagged or heaved, air gets into the measures and more layers are flexed in consequence. After a while so much vertical face of rock has been exposed that the vertical expansion is considerable. In consequence the sides of the opening made by previous roof collapses will shear and fall.

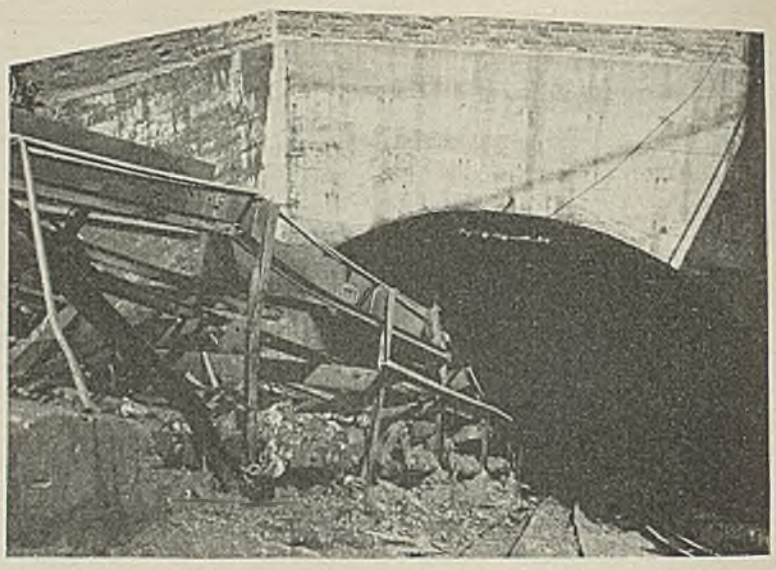
In such cases longwall advancing seems indicated as the best method of operation because the roof will have an opportunity to expand into the gob on either side with less resistance than it would experience where solid ribs of coal or rock confront the expanding material. When the roof has a chance to expand laterally it will not try to swell by sagging. The same is true of the floor. If it can heave into the gob it will be less active in heaving into the roadway, especially if the gob is not too closely stowed.

It is clear, furthermore, that wherever the roof expands the advance of the face must be speeded and that props must not be set too rigidly or packwalls built too tight. These are elements in roof control regarding which only cursory inquiry so far has been made.

In the Shamokin mine it was found that speed in dewatering old headings caused heavy roof falls. Here again is a study. Were the falls due to oxidation or contraction or were they due to the hydraulic pressure of water imprisoned in the roof? If the answer to the question were known the roof-control problems might be more understandingly approached.

Surely expansion of roof and floor is a study that deserves more consideration. All American inquiries hitherto have been made in the field. A little research in the laboratory into rock constitution and into expansion due to exposure and moisture might help to elucidate some mysterious occurrences. The British, it is true, have made some interesting studies as to the chemical constituents of mine rock and into the reason for their occurrence. But by and large the inquiries now being made follow the methods which practical men have adopted for centuries without much result. What is needed is a radical departure that will uncover a true technique.

Commission Finds Broken Conveyor Cause of Kinloch Disaster



A BROKEN conveyor, followed by an impact of metal and coal at the bottom of a slope, with a resulting electric arc in the presence of coal dust were found by a commission of federal and state officials to be the cause of the Kinloch mine explosion, at Parnassus, Pa., on March 21. A verdict absolving the Valley Camp Coal Co. from any blame for the explosion was returned by the jury attending the coroner's inquest of this accident. The inquest was held in Greensburg, Pa., on April 11, and was directed by John Ira Thomas, Pennsylvania's deputy secretary, bituminous division. In this explosion, it will be recalled, 46 men were killed, 1 on the outside; 4 were injured and 212 escaped after hours of self-rescue strategy in finding a way out through unfrequented passageways to openings of an idle connecting mine.

W. J. McGregor, state mine inspector of the Fourteenth Bituminous District, gave as evidence a report of findings and recommendations by a commission, of which he was a member, appointed to investigate the explosion. Others on this commission were John F. Bell and Alexander McCanch, state mine inspectors; J. J. Forbes, C. W. Grove and R. D. Currie, engineers of the U. S. Bureau of Mines. Following is an abstract of this report:

Kinloch mine is in the Thick Freeport seam, which was worked by the roof-and-pillar system. The main opening is a slope 280 ft. long on a 30-deg. pitch which accommodated a steel-pan conveyor for coal, a car track for refuse and supplies and a stairway for man travel, all in one compartment. The total length of this conveyor, top and bottom strands together, was 860 ft., and its width 5 ft. It had a carrying capacity of 60 to 70 tons of coal, and drove, by chain and sprockets, an auxiliary conveyor which fed it coal from an 8-ton dump bin at the foot of the slope.

Two systems for arresting the dust arising from the dumping operation were installed. In the first system water was sprayed over the dump by two revolving jets. Secondly, a dust collector consisting of an 8-in. pipe extended from the upper level of the dump bin to an expansion chamber which was connected to the upcast by a 12-in. pipe.

Incandescent lamps, strategically placed, lighted the slope bottom. Two of these lamps, of 50-watt capacity each in a 250-volt d.c. circuit, were positioned in the pit housing, the receiving bin of the coal dump. Mine cars were handled by two electrically driven chain hauls and not far from the dumping point were energized trolley lines. The machine shop was close to the foot of the slope and in it was stationed an electric motor with necessary wiring, switching and starting devices. This shop was supplied with an acetylene welding outfit, a heating unit of the oil-burning type and two blow torches. An electrically driven pump was located in close proximity to the dumping point.

At 7:25 a.m., on March 21, the upper or load strand of the conveyor broke at a point several feet below the head sprocket and descended toward the slope, a portion of it lodging on the incline above the slope portal and the remainder going to the bottom. The runaway conveyor carried with it to the bottom of the slope 50 to 60 tons of coal. An explosion immediately followed which set fire to the tipple, destroyed much of the steel structural work and so badly damaged the fan as to render it inoperative. A car and other heavy objects which were thrown upon the lower strand of the conveyor indicated that the explosion followed the landing and impact of the conveyor.

Twisted Mass of Steel at Ground Landing

The commission found that the conveyor was examined on the day of the explosion and that this was a daily practice. "But the practice," the report states, "did not appear to have been so sufficiently established that the management had knowledge of it. However the management was conversant with the fact that night men worked on the conveyor and examined it, but this working and examination may have been contingent on the discovery of defects."

According to the commission, the source of ignition was in the immediate neighborhood of the slope bottom and the ignition agent was a flame discharged from some electric carrying apparatus. The most likely agent appears to have been the electric wiring and lamps used to illuminate the dump pit, these being the first possible agents of ignition with which the dust would come in contact.

That the explosion was propagated by excessive accumulations of coal dust at the slope bottom, in the passageways and trackless entries leading to the active workings, is the commission's opinion. This dust came from normal operation of the dump. Referring to the sprinkling system over the dump the commission reports: "We have no positive evidence that this sprinkling arrangement has been in operation since December, 1928."

Kinloch mine is developed from a four-entry main system and has a large area in which the coal has been only partly extracted. It is ventilated on the exhaust principle, receiving its air from four openings, one being the main slope and the other three being two to

four miles from the fan. At the time of the explosion the fan was exhausting about 241,500 cu.ft. of air per minute against a resistance of 10.4 lb. Of this volume 161,400 cu.ft. per minute entered by way of the slope and much of it passed over the dump at the slope bottom. The velocity of the air in the slope was about 1,050 ft. per minute.

"It is quite probable," states the commission, "from the complication of forces between the dumping point and No. 4 butt left that propagation was advanced by ignition of gas in this area and possibly in idle areas on the east side of the mine near the slope bottom." This appears to be supported by the fact that explosive gas was found in recent months in Nos. 3 and 4 butt left on the west side of the slope and by the fact that a squeeze was progressively approaching the entrance of this opening, making conditions unfavorable for thorough ventilation.

"No evidence has been found indicating that this area was examined once each week, as the statute requires," states the commission's report. "What is said above with respect to weekly examinations is also true of the other open and non-producing areas on the east side of No. 1 face entry near the bottom of the slope. This augmentation of propagation is further supported by the fact that considerable quantities of methane were found in these workings during recovery operations."

The force of the explosion, with the slope bottom as a center, "traveled north, expanding to the east and west where opportunity afforded, and dying away in the neighborhood of a line running almost due east and west on the outby side of No. 15 butt on No. 7 face entry." The gradual recession of force was due to the combined effects of expansion, to accumulations of water in areas of depression and to the rock-dusted tracked passageways. After damp was projected some distance beyond the limits of force. The force approached over two routes the Dabble-Duck section, where men were at work. These forces did not meet and consequently the only impairment of this section was occasioned by afterdamp.

All of the men who lost their lives were involved by the force or effect of the explosion except seven who attempted to escape by way of the slope, contrary to orders of their superiors. The men alive after the explosion soon discovered that their escape by the slope had been cut off by afterdamp. They were compelled, therefore, to find their way out through unmarked and unfrequented passageways, in some of which were pools of water, to the other portals, two to four miles from the main opening. Much patience, good judgment and courage were displayed by the underground officials and others in forming the men into ranks and guiding them out. One man barricaded himself in and was met the day after the explosion by a rescue crew.

O. F. Taylor, superintendent of the Kinloch mine, explained that an air lock had been established on the slope bottom in order that most of the air entering the slope as an intake could be shunted past the dump. John G. Bryson, outside foreman, said that calcium chloride, because of its property of holding moisture, was spread on the slope bottom over a stretch of about 600 ft. He testified that the end of the energized trolley line was about 200 ft. from the dumping point, also that a pump was located in a sump in the slope about 50 ft. from the portal. The distance of this pump location from the portal was given as 125 ft. by E. R. Jobes, assistant mine foreman. This pump was driven, according to Mr. Taylor, from a 440-volt a.c. line extended from the outside through the slope to the sump. Mr. Bryson stated that a 20-volt signal line connecting the surface with the bottom, passed down the slope; that the power lines to the underground were hung in boreholes. He also said that the underground machine shop was located about 100 ft. from the dumping point.

An attorney representing the interests of families which suffered loss of life in the explosion, in cross-examining several witnesses, asked if it were true that débris had been allowed to accumulate in and about the machine shop and that ventilation of this shop was effected by brattice cloth. Mr. Taylor testified that this shop was a widened-out entry,

(*Turn to page* 316)

Recommendations of Investigating Commission

1. That the use of the conveyor be discontinued as a means of transport until and unless it be provided with an automatic device or devices capable of preventing the conveyor or any part thereof from running away on a slope in the event of breakage of the conveyor, and that any device or devices installed to effectuate this recommendation shall be approved by the inspector of the district, aided by such mechanical engineering advice as may be necessary.

2. That all roadways, airways and working places be thoroughly rock-dusted and so kept that the percentage of non-combustible to the mine dust shall be greater than 65 per cent and that such rock-dust treatment be maintained within 40 ft. of the working faces.

3. That the wherewithal for supplying and maintaining a means of conducting water along the cutter bar of each mining machine be provided and that sufficient hose be supplied in each working place so that the face region may be kept watered and wet.

4. That all open and idle workings be ventilated in so far as this is consistent with mine practice and that such workings be examined by the mine foreman or his assistant or assistants once each week, as required by the statute, and the results of such examinations made a matter of record in the book provided by the commonwealth for that purpose.

5. That a determination be made as to whether or not the openings to the surface of this mine are in accordance with the intent and purpose of the statute, because of the great distance by which they are separated.

6. That all passageways over which men are required to travel to the openings at the surface shall be well drained and otherwise kept safe and comfortable for travel and be supplied with sufficient direction signs for the guidance of those who may be compelled to travel to the openings.

Tipple Damage by Force and Flame

NOTES

From Across the Sea

FOR many reasons mechanical mining in Continental Europe and in this country has developed in totally different directions. Among the causes for this differentiation are the greater prevalence of gas in Europe, which makes shooting more dangerous, and the frequent occurrence of steep pitches, which machines have only recently learned to climb with facility. The distinguishing tool in the German bituminous-coal industry is the pneumatic pick, an implement which is practically unknown here for digging coal. Without it, however, the Germans would find themselves much hampered.

In France after the Courrières colliery disaster in 1906—says *Der Bohrhammer*, of Flottman A. G., Herne, Westphalia, in an article of which much use has been made in the remarks which follow—shotfiring was forbidden in coal with the result that air picks were introduced to lower the extremely high costs consequent on the mining of coal by hand without the aid of explosives.

It is easy to realize how the introduction of this tool, which is made in varying forms by many firms in several countries including the United States, has aided the man who up to that time had dug out his coal entirely by hand. It greatly increased his output, the degree depending, of course, on the type of tool and on the condition of the coal and rock and on the way in which the work was organized. In 1927 the output of the hewers in the Ruhr showed an increase of 34 per cent over the figures for 1913.

THE use of pneumatic picks also reduced accidents. Less shots, smaller shots or no shots are fired and in consequence the likelihood of firedamp and coal-dust explosions is decreased. But this reduction in shotfiring also protected the roof. Furthermore, where the shots were made less heavy, timbering could be placed nearer the coal, and where they were omitted altogether timbers could be set close to the coal face. Naturally anything that eliminated shooting did away with the numerous accidents chargeable to misfires, premature and delayed detonations, blow-out shots—a long train of unfortunate circumstances the recital of which might fill a page. At a certain colliery in the Ruhr district accidents dopped 14 per cent after only a partial introduction of the pneumatic pick.

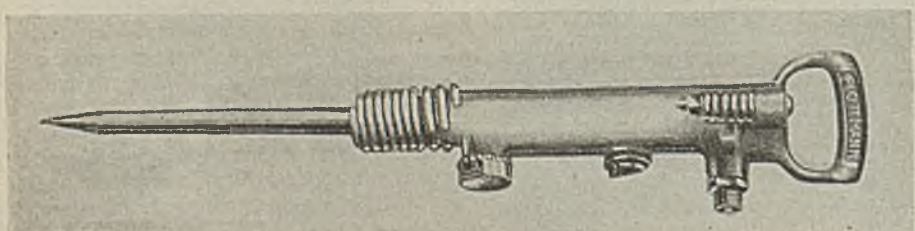
When coal is recovered by shooting, the shots break the partings into fragments, but a miner can handle his air pick so as to remove the partings in relatively unbroken masses. As a result the coal is cleaner and the washery is saved much work. The coal is larger also than when shot with heavy charges. Timbering is less expensive because of the improved condition of the roof, and the cost of explosives is reduced.

The figures from 40 different mines in the Ruhr coal field have been averaged and the savings in explosives due to the general introduction of these mechanical picks has been found to be 60 per cent. The steady production of coal without delay for shotfiring makes it possible to use other equipment, such as conveyors, inclines, etc., continuously throughout the working shift or shifts. For instance, if such an implement could be used in Illinois and Utah in an otherwise satisfactory manner it might overcome the hindrance imposed by the requirement that shooting be done when the mine is not working, for shooting could be entirely eliminated.

AN ADVANTAGE with the pneumatic pick that appeals to those working in deep beds is the fact that the air coming from the drills is cool and thus reduces the temperature of the working faces. If the air were compressed by electricity, near the working face the heat of compression could be communicated to the return, affording to the working faces the cooling effect of decompression. In the return the disadvantages of the compression, of course, would be negatived by admixture with the air from the face which the decompressed air has brought to a lower temperature than is normal for that location.

The type of pneumatic pick which should be chosen depends on the method of operation. A heavy pick cannot be used on anything resembling upraising in coal or rock or in bringing down either material in a roadway. Wherever possible it is arranged to work downward, thus reducing the labor to be performed by the miner. Sometimes the coal is hard; then it is more important that the pick deliver a heavy blow than that it strike a large number of blows in a minute. Where the coal is soft it is desirable that the tool be light and strike more rapidly.

Fig. 1—Picks Like These Are Extensively Used in Europe



Sometimes these picks are used in connection with undercutting machines, but care must be taken lest, when the place is on a steep pitch, pieces large enough to injure those below or to clog the chutes are dislodged. It is assumed, of course, that the man using the pick will be so located that the coal, large or small, will not fall on him. In some instances the pick is used for making an undercut and for a variety of other secondary purposes.

Two illustrations indicate how these pneumatic picks are used. Both represent places in gas coal. One has a pitch of 40 deg. and the other one of 85 deg. In the former illustration,

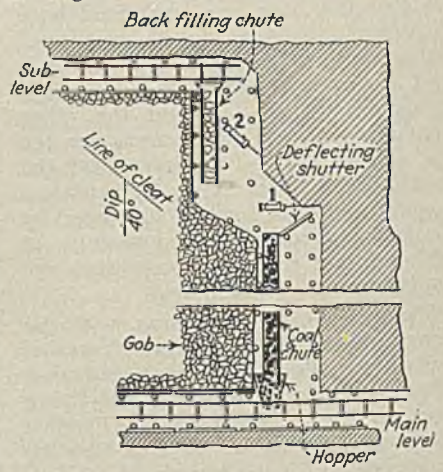


Fig. 2—To Work Downward and to Follow the Cleat the Coal Is Cut on an Oblique Face

Fig. 2, the coal is compact and as the distance between cleats is about 8 to 10 in., these layers are skinned off the sloping face from position 1 to position 2, the workman being at all times where the coal fragments which his pick detaches cannot strike him. The thickness of the coal is 4 ft. 6 in.

IN THE latter illustration, Fig. 3, the coal is 8 ft. thick and quite hard. The method is suitable to places where a large area can be opened safely without stowing. The miner is working vertically and so does not have to support his pick except when moving it. It is to be presumed that he commences his work at the edge of the step and works back to the next riser.

The hammer pick is light and inexpensive and so can be furnished to every miner. Of course, it involves the use of a more or less portable compressor for the delivery of the necessary air. Furthermore, the air pick cannot do the work of an undercutting machine and powder, but, as compared with such a combination it has the advantage that in working in gas it does not introduce electricity to the working face and that it does not cost so much that in a room-

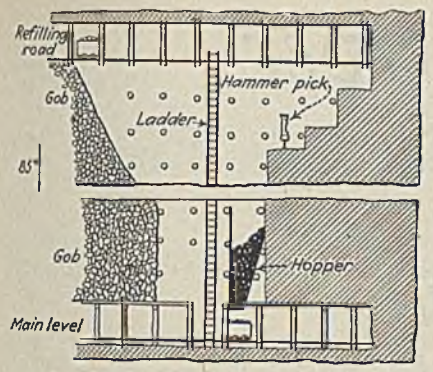


Fig. 3—Working Straight Down From the Edge of a Step or the Face of Coal Cliff

and-pillar mine the owner would have to move the pneumatic pick from working place to working place in order to get a return on his expenditure. Where air is available such a pick might be invaluable in the face of a machine-loading place for trimming down the coal which a shot has failed to dislodge.

According to James H. Pierce, who is now at Kharkov, U.S.S.R.: "In the Ruhr district of Germany there is a decided movement away from cutting machines, the claim being that with inclined seams over 30 deg. the pick hammer will produce cheaper coal. These hammers range in weight from 11 to 30 lb. and consume from 18 to 24 cu.ft. of free air per minute. They are non-rotating and depend on impact to loosen the coal.

"The accompanying table, taken from the German periodical *Glückauf*, will indicate the increased use of pick hammers and the decrease in mining machines:

Mining Machines in Ruhr District

Year	Cutting Machines	Pick Hammers	Jack-hammers
1913	15	27	11,656
1914	22	.....	15,186
1924	445	23,088	35,518
1925	605	41,309	36,502
1926	470	45,299	33,104
1927	358	64,428	33,559

"At the Thyssen mine a three-month test developed that when the pitch exceeded 30 deg. the pick-hammer output per man was 25 per cent greater than when cutting machines were used and the exposive cost was reduced 40 per cent. The financial reasons for the elimination of mining machines is given as follows: One mining machine costs $3,000 and will produce 80 to 150 tons per shift in a 3-ft. seam, whereas a pick hammer costs $30 and produces 5 tons per shift under the same conditions. Therefore it is possible to buy 100 pick hammers for the price of one mining machine and these will cut 500 tons per day. Much may be said in favor of pick hammers under German conditions, but I cannot see their application to anthracite because of its hardness and lack of cleavage planes."

R Dawson Hall

On the ENGINEER'S BOOK SHELF

The Cleaning of Coal, by W. R. Chapman and R. A. Mott; 680 pp., 6¼ x 10 in. Chapman & Hall, Ltd., 11 Henrietta St., W. C. 2, London, England. Price 42s. ($10.33) net.

A real service to the coal industry has been the publication of this volume by Chapman and Mott with its introduction by R. V. Wheeler. They have produced a book on coal cleaning that is as international as any the reviewer has ever had the pleasure of perusing.

As a presentation of American methods of coal preparation it is more complete than any American book, though it has nothing to say as to the dry-cleaning methods that were so industriously developed in the anthracite region prior to the introduction of washing processes. Some of them are still in use and therefore should be worthy of some notice. The Emery, Devers, Mason & Allen, Farr, Mowry and Norman pickers might have been at least described. However, there is an account of the British Berrisford separator, which works on a somewhat similar plan.

Nor is any mention made of the American Ayres picker or of the disintegrating pickers, such as the Bradford breaker, which latter is still in use. The large place that pickers of this type at one time filled makes them as noteworthy as or more important than some of the equipment mentioned. The fact that they were developed before our washing system had acquired merit in British eyes and adoption in British collieries explains why they are omitted.

Though the authors say that "many of the [American] washers are—in European eyes—of rather primitive design," they are willing to admit that many of the modern ones are so worthy of consideration and report that they fill a large part of the volume.

In these days of broadcasting and broad distribution of technical literature one has to be careful of one's audience. If the charge had been made a little bolder, and at the same time a little more cautious, it would have occasioned less comment. The authors might have said: "Many of the washers are, in both European and American eyes, somewhat primitive," and they would have pleased almost everyone. The Hydrotator, be it noted, has changed considerably from the form which the authors illustrate.

The reader will be delighted to find space given to several machines little known in this country. These include the Malecot, Delcuvellerie, Lequeux, Ranwez, Kleinbetinck, Ekof, Humboldt, Coppée, Electro-Osmose and Elmore Vacuum Flotation from the Continent, and the British Frongoch, Mackworth, Dor, Stewart-Waldie, Ellcott, Murton, Craig, Huntingdon - Heberlein and Broadway.

The book describes the impurities in raw coal, its examination before cleaning, theory of coal washing in jigs and upward-current washers, theory of coal washing in general, history and present status of coal washing, various jig, launder and table washers, dry cleaners that depend on media of certain specific gravity, froth flotation, ash separators, dewatering of washed coal, washing water, screening, washery control, value of clean coal and economies of dry cleaning.

* * *

"Mergers and the Law." National Industrial Conference Board, Inc., 247 Park Avenue, New York City.

This latest study of public policy toward business, by the National Industrial Conference Board, is devoted to an analysis of the practical effect of anti-trust legislation as interpreted by the courts and the change in public attitude toward consolidations. It is found that anti-trust prosecutions have declined in number during recent years; that out of the 174 governmental actions brought invoking the anti-trust law, only 38 were predicted primarily upon the fact of consolidation and that in only 9 per cent of all cases, including private suits, were the defendants charged simply with being mergers. Evidently, in the light of this study, occasions for legal attack upon business mergers are diminishing.

The Conference Board study, however, in effect upholds existing anti-trust legislation in principle as a means of protection of individual business concerns against "aggressive and predatory attacks and interference from outsiders." The conclusion is reached that the anti-trust laws, as now interpreted, provide no serious hindrance to legitimate mergers, as "the law [the Sherman and Clayton acts] provides the possibility of ultimate vindication for every species of corporate expansion which has economic warrant."

The report contains a careful analysis of decisions in leading cases from the time the Sherman Act went into effect, tracing the development of the "rule of reason" and its concrete application, discusses in detail factors determining the lawfulness of business consolidations and recent federal legislation having bearing upon the anti-trust policy. The study is a companion volume to two earlier reports by the same organization entitled: "Trade Associations: Their Economic Significance and Legal Status" and "The Public Regulation of Competitive Practice."

machine than it can care for in six hours of continuous cutting. The time taken to clean up the places varies considerably, as no two places turn out exactly the same amount of coal; the loaders vary in efficiency and performance and the coal may vary in height even in the same run. On the six-hour basis it will be found that cutting will be light about one-third of the time, while for the remaining two-thirds of the time the machine crew will be hitting on all four. Light cutting time will give the mechanic a chance to overhaul the machine and thus prevent many breakdowns.

While it is true that night cutting has its merits, it is only in mines where the power is poor that it is worth while. It means extra expense in running the generators at night and additional supervision. Only where the power is poor and where the road motors are hogging the juice is it at all justifiable. Cutting can be done in the daytime just as well as at night and if the men are bunched the haulage need not suffer.

Where uncertainty exists as to what places need cutting, the following method is helpful: At the end of the day's run the machine usually is left in or close to the room to be cut first next day. When the machine is set up and running, one of the crew takes care of it while the other runs the places to see how the cutting is and to determine the order of their work. When the men and turn run steady, the places are cut in rotation as near as possible. ALEXANDER BENNETT.

Panama, Ill.

Bosses Should Make Reports Of Cutting Needs Each Day

BETTER results are obtained by giving the machine crews a little less than they can do during a shift. Then they will not leave down places on the excuse that the places are not properly cleaned up. They also will try to get every ton of coal they can and won't hesitate to move out a small amount of coal in places which otherwise are ready for cutting. Coal for the night shift should be cut on the day shift except in development headings that are being worked day and night. These can be cut for the night loaders by the night machine crews, who at the close of a shift also cut for the day loaders. Under no circumstances should a machine crew be worked longer than twelve hours in one stretch.

A report of all places cleaned up should be made by the section or cut boss. These reports should be given to the foreman each shift, and should be closely checked by him. If he finds that any one crew has more cutting than he thinks that crew can do conveniently in a shift's time, he should reallocate the cutting between the crews. My method is to have the section bosses visit the places in their respective territories twice a day and record such information relative to cleanup progress as is pertinent to the cutting schedule. In each visit the section foreman records the miner's number, the number of cars he has loaded, total number of cars loaded in the section, the absentees and why they are absent and what places are ready for immediate cutting. This information is handed to the machine crew.

The section boss also notes what places are ready for drilling and shooting and passes the information in reports to the drillers and shotfirers. It is seldom that a loader leaves our mine because he has no coal. There are other things besides cutting that may hinder the loader and it is wise to meet the emergency by having a couple of spare places ready.

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

Day-by-Day Upkeep Prevents Cutting-Machine Breakdowns

THE usual cause of places not being cut is mechanical breakdowns. These can be minimized by instituting daily reports from cutters to the repair department, reinforced by daily inspection of the machines by the department. This program can be helped along by placing all wiremen, pumpers and similar workers under the mine mechanic.

If the cutters cannot get the work done a variety of things might be found wrong, as, for instance, weak power, long trams, bad bits and a host of other faults, all of which can be remedied by close supervision. Night cutting is preferable. An extra machine should be available in the event of a breakdown and at large mines a night repairman should be kept on the job. A good plan is to make all places of such width that they can be cleaned up each day. This method will give the cutters a uniform amount of work each day.

Paintsville, Ky. GEORGE EDWARDS.

Night Cutting Is Best

JIM should reorganize his system of cutting. Cutting by the ton is better than by the hour, for the men paid by the hour will lay down on the job and the mine foreman can't be on their heels all the time. I cut coal for thirteen years both ways and worked hard at all times, but there are men who will not.

If a cutting crew has too much work there is nothing left to do but add another crew. That means buying another cutting machine and the raising of a howl somewhere. Quite often the problem can be solved not by adding more machines but by hiring or developing better cutters. A good machine crew will keep 35 to 40 men in coal without much trouble. Any crew not having enough work to keep it busy can fill in time by loading coal. Night cutting should always be more efficient than day cutting because the machines can be moved without danger of meeting up with a locomotive, the air is free of smoke and better power is available. FRED GAUL.

Sagamore, Pa.

Has Cutters Work From Ends And Meet in the Middle

SEVERAL months ago I was put in charge of six crews of cutters. Several systems had been tried for night cutting, but in no case were the results entirely satisfactory. The system which I worked out on taking charge has resulted in the leaving down of less than six places per month. The machine men were told that every place must be cut except where dangerous conditions exist and these are immediately removed. The cut bosses are required to paint center and rib lines with white paint and in doing this they have the opportunity of seeing which places are not cut. They hand their reports in at the mine bosses' office I make it my business to go over these reports every day. I work machines in units of two, where possible, having them work toward each other until they meet. I tell each of the crews how many places the other crew in the group has to cut.

After issuing the necessary instructions to the crews, I start out in an examination of places. If I find cars blocking the way I have them removed; if I find slate falls I have them cleaned up, and if I find places in need of timbering I have them timbered. As I go from place to place I make note of every omission made by the cutters or the loaders and at the completion of my examination make out a report of conditions, which I present to the mine foreman in the morning. He in turn takes up specific cases with the cut bosses. I never leave the mine before the last of the cutting crews has finished its work. When I find that one crew has finished up its work and that another has about four hours of work to do I compel the first crew to help the second. C. E. LIVELY.

Caples, W. Va.

Reports Should Be Gathered For Study in Foreman's Office

ASSUMING that Mac has a sufficient number of cutting machines, he can offer no reasonable excuse for having fifteen men out of work on account of no coal. I don't believe he is neglecting his job but I do think he has allowed his cutters to get out of his control. Our machine operators are selected from among the most reliable and intelligent men on the payroll; they are paid higher wages than other labor. For these reasons they can be depended upon to maintain a uniform cutting rate and keep all loaders satisfied.

The foreman should not allot to a

cutting crew more places than can be cut in eight to ten hours. The majority of machine runners want a larger territory than they can take care of properly. If their wish is granted, in an attempt to cut all places they will rush their job and commit or omit acts which may prove fatal or at the least interfere with efficient mining.

All information relative to cutting requirements should be presented on a board or by printed forms and kept at the foreman's office. It should be compiled jointly by haulage men and the foremen. The cutters should report at this office and study these reports before going to work. They should also report back at the close of their shift and record the places cut, the places not cut and why, what machine repairs are needed, the status of cutter-bit supply and what wiring extensions, if any, are needed. These reports should be studied by the foremen first thing in the morning. Particular attention should be paid by the foremen to places not cut. Day cutting is not advisable.

I suggest that Mac do a little night work in order to better organize his cutting. A trip into the mine one night each week will accomplish much. Check up on the cutters, on power, wiring, care and inspection of machines, lubrication and changing of bits. Bad machine reports will stop coming then because cutters will soon realize they can no longer get away with hit-or-miss methods. VICTOR G. GANDY.

Hepzibah, W. Va.

Driving Places Narrow Saves Timber With Safety

WHILE it is desirable to adopt system to reduce accidents from roof falls, materials should not be wasted in doing the job. Timbering material is quite expensive nearly everywhere, as few mines have an available source near at hand. I don't think it wise to drive wide rooms under slate roof even if roof coal is left in place. Neither do I believe in trying to hold up 5 or 6 in. of drawslate. Usually this means that a great many timbers must be used, placing a row of them on either side of the track.

If the rooms are allowed to stand for some little period of time before the pillars are taken, it will be found that the timbers have failed through rotting. If an attempt has been made to hold the drawslate much of it will have fallen. This means that a number of falls will have to be cleaned up and new timbers set before the pillars are taken. Use plenty of safety props to hold up drawslate until two cuts have been taken. Then take down the drawslate, shooting it if necessary.

Our mining is done on the room-and-pillar system, with crosscuts every 60 ft. In mining the pillars slab cuts are taken in the interval between crosscuts. After each cut the track is moved over and two rows of props set close to it.

Mac should quit his job if he can't sell his boss on the idea of safe timbering. If a man were killed because of insufficient timbering Mac would be asked to leave. Not long ago I heard a manager say that if he were to get a man killed on this account he would feel as mean as if he had taken a gun and killed him outright. OSCAR DOWDLE,

Splashdam, Va. Assistant Foreman.

Get Close to the Men

MY EXPERIENCE as a coal miner and executive of coal companies in West Virginia, Kentucky and Illinois during the last 36 years may contribute something of value to the discussion, "Why Is a Good Foreman?" One of the requisite duties for a foreman, and perhaps the most important, is to keep his men interested in their job. To do this, the foreman must keep in close touch with his men by frequent visits to the working places and there discuss various phases of the work with them. These visits, aside from informing the foreman as to what is going on, enable him to get close to the hearts of the men, and he learns whether they are contented, and if not, why they are dissatisfied.

The practice will prevent quitting of many good men, a costly loss to the company. Remember that frequent visits to the working places give the miner an opportunity to know the foreman better and to understand the management's side. If the foreman is negligent in this regard the miner will tend to feel that he can do without him and very soon actually believe it. He will also follow the boss' example and lose interest. If the foreman knows his men and they know him much progress has been made toward paving the way for putting across new ideas. And don't forget to whisper a few safety measures before leaving each place.

Drakesboro, Ky. BENJAMIN LOHR.

Recent Patents

Blasting Explosive; 1,706,517. L. N. Bent, Holly Oak, Del., assignor to Hercules Powder Co., Wilmington, Del. March 26, 1929. Filed July 26, 1927; serial No. 208,661.

Drier; 1,706,708. Lewis J. Robb, Pittsburgh, Pa., assignor to Heyl & Patterson, Inc., Pittsburgh, Pa. March 26, 1929. Filed July 3, 1926; serial No. 120,300.

Roller Support for Rotary Dumps; 1,706,585. Erskine Ramsay, Birmingham, Ala. March 26, 1929. Filed Sept. 6, 1927; serial No. 217,819.

Catching Device for the Cages of Hoists, Lifts and the Like; 1,707,099. Bruno Stein and Otto Munzer, Obergruna, Germany. March 26, 1929. Filed Dec. 23, 1927; serial No. 242,206.

Art of Burning Pulverized Coal; 1,707,335. John Van Brunt, Flushing, N. Y.; assignor to Combustion Engineering Corporation, New York City. April 2, 1929. Filed Oct. 3, 1924; serial No. 741,361.

Art of Coking Coal in a Retorting Space; 1,707,427. Joseph Becker, Pittsburgh, Pa., assignor to the Koppers Co., Pittsburgh, Pa. April 2, 1929. Filed July 24, 1922; serial No. 577,013.

Drilling Mechanism; 1,707,631. Elmer G. Gartin, Claremont, N. H., assignor to Sullivan Machinery Co., Chicago, Ill. April 2, 1929. Filed Oct. 17, 1921; serial No. 508,334.

Skip Hoist; 1,707,954. Robert H. Beaumont, Radnor, Pa., assignor to R. H. Beaumont Co., Philadelphia, Pa. April 2, 1929. Filed March 10, 1928; serial No. 260,626.

Skip Hoist; 1,707,958. Arthur Warner, Haverford, Pa., assignor to R. H. Beaumont Co., Philadelphia, Pa. April 2, 1929. Filed Oct. 20, 1926; serial No. 142,812.

Spiral Lowering Chute and Method of Manufacture; 1,708,129. Frank Pardee, Hazleton, Pa., assignor to Anthracite Separator Co., Hazleton, Pa. April 9, 1929. Filed Feb. 21, 1925; serial No. 10,740.

Hoisting Mechanism; 1,708,188. Charles F. Osgood, Claremont, N. H., assignor to Sullivan Machinery Co., Chicago, Ill. April 9, 1929. Filed Jan. 19, 1922; serial No. 530,387.

Support for Endless Conveyors; 1,708,257. William D. Coll, Muncie, Ind., and William J. De Reamer, Crown Point, Ind. April 9, 1929. Filed Sept. 7, 1926; serial No. 133,817.

Pulverized Coal-Feeding Device; 1,708,505. George P. Jackson, Flushing, N. Y., assignor to International Combustion Engineering Corporation, New York City. April 9, 1929. Filed Sept. 3, 1925; serial No. 54,176.

Conveyor; 1,708,559. George S. Atkins, Scranton, Pa. April 9, 1929. Filed March 14, 1927; serial No. 178,011.

Wheel Mounting for Mine Cars; 1,708,608. Glenn E. Edmunds, Columbus, Ohio, assignor to Bonney-Floyd Co., Columbus, Ohio. April 9, 1929. Filed Feb. 4, 1928; serial No. 251,947.

Process for Low-Temperature Distillation of Bituminous Coal; 1,708,740. G. E. Rohmer, New York, assignor to National Coal Distillation Corporation. April 9, 1929. Filed April 23, 1927; serial No. 186,021.

Skip Hoist Structure; 1,708,913. Robert H. Beaumont, Radnor, Pa., assignor to R. H. Beaumont Co., Philadelphia, Pa. April 9, 1929. Filed May 4, 1928; serial No. 275,057.

Apparatus for Carbonizing Coal; 1,704,103. Richard L. Rodgers, Chicago, assignor to Charcolite Corporation, Clinton, Ind. March 5, 1929. Filed Sept. 28, 1922; serial No. 591,008.

Plant for Washing Coal and Other Minerals; 1,704,185. Antoine France, Liége, Belgium. March 5, 1929. Filed Nov. 7, 1927; serial No. 231,649.

Electrically Ignited Detonating or Blasting Cap; 1,704,222. A. G. Schuricht and J. D. McNutt, Alton, Ill., assignors to Western Cartridge Co., East Alton, Ill. March 5, 1929. Filed Aug. 30, 1924; serial No. 735,203.

Aerial Bucket; 1,704,556. W. R. Coleman, Birmingham, Ala. March 5, 1929. Filed Feb. 25, 1925; serial No. 11,622.

Portable Base for Mining Machine, 1,704,674. Gilbert Rimmer, Nottingham, and Austin Y. Hoy, London, England, assignors to Sullivan Machinery Co., Chicago. March 5, 1929. Filed Jan. 18, 1926; serial No. 82,042.

Coal Car; 1,705,006. George J. Duffy, Toronto, Ont., Canada. March 12, 1929. Filed Nov. 12, 1927; serial No. 232,844.

Coke Treatment and Product; 1,705,020. A. A. Kohr, Maplewood, N. J., assignor to the Koppers Co., Pittsburgh, Pa. March 12, 1929. Filed Sept. 25, 1925; serial No. 58,493.

Blasting Cartridge; 1,705,248. H. S. Hart, Chicago. March 12, 1929. Filed Oct. 1, 1927; serial No. 223,262.

Coal and Rock Separating Mechanism; 1,705,456. Toyojiro Katayama, Standardville, Utah. March 12, 1929. Filed March 7, 1924; serial No. 679,640.

Vibrating Screen; 1,705,619. Myron A. Kendall, Aurora, Ill., assignor to Stephens-Adamson Mfg. Co., Aurora, Ill. March 19, 1929. Filed June 19, 1925; serial No. 38,149.

Chain Conveyor; 1,706,268. Norman P. Wagner, Tamaqua, Pa., March 19, 1929. Filed May 29, 1924; serial No. 716,807.

Separation of Materials by Flotation; 1,706,281. Frank E. Elmore, Boxmoor, England. March 19, 1929. Filed April 23, 1927; serial No. 186,114.

Loading Machine; 1,706,313. Norton A. Newdick, Columbus, Ohio. March 19, 1929. Filed Aug. 11, 1924; serial No. 731,294.

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

Synchronous Motor Now on Fan At New Orient Mine

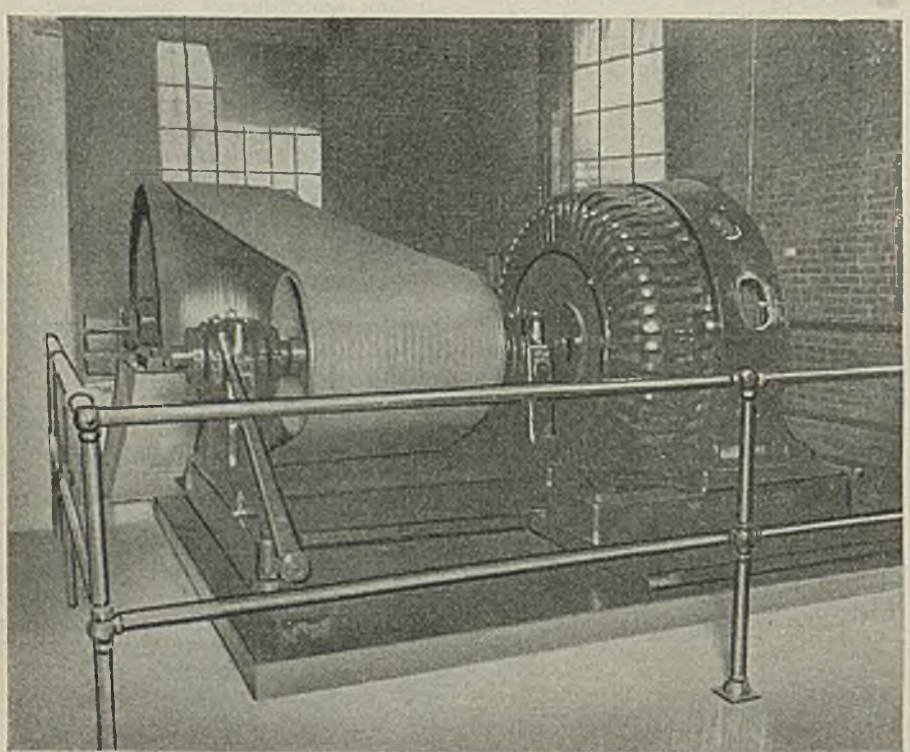
BECAUSE the power factor of a synchronous motor varies widely with load fluctuations unless there is a continual adjustment of field current, the mine fan is an ideal place for that type of motor when a degree of power-factor correction is needed at a plant. For this reason the original 300-hp. slipring induction motor of the fan at New Orient mine of the Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill., was displaced in 1928 by a 500-hp. synchronous motor. The type of belt drive on this installation is in itself a feature out of the ordinary at coal mines.

The need for power-factor correction was during the hours of light load in the mine. On the day shift ample correction was supplied by the synchronous motor-generators of the inside substations. These consist of four 500-kw. and three 300-kw. units, all of which are fully loaded. Between the hours of 4:30 p.m. and 7 p.m., when the night work begins, and for a period during the morning the underground substations are shut down and a 200-kw. motor generator on top is started to take care of the d.c. blower fans. Operation of the 400-hp. auxiliary hoist caused the worst points in the power-factor curve.

During those times of light load in the mine the power factor went as low as 55 lag. Now, with the synchronous motor in continuous operation driving the fan and consuming about 255 kw., the average power factor is 95 to 96.

The motor is a Westinghouse with built-in magnetic clutch and is rated 2,200 volts, 600 r.p.m., 500 hp., 132 amp., 80 per cent power factor. It is installed on the foundation of the old motor, which location provides only a 14-ft. belt center, yet the idler pulley formerly employed was disposed of by using a special flat belt.

Improved Power Factor and Mechanical Drive



This consists of a 36-in. "Tentacular" canvas belt impregnated with Balata gum and having riveted to the inside 21 longitudinal strips of ⅛ x 1-in. soft chrome leather. Thus the pulley contact is but 21 in., although the belt width is 36 in. The holding rivets, which are spaced every 2 in. along the chrome strips, are cup-shaped on the pulley contact end. The permanently high coefficient of friction of the strips is said to be aided by the air pockets created by the hollow ends of the rivets.

The fan pulley is 8 ft. in diameter and the motor pulley 30½ in., and both have smooth metal surfaces. The motor pulley is without crown, but the fan pulley has a slight crown. The fan speed is 192 r.p.m. and the belt speed 4,825 ft. per minute.

A. E. Giles, chief electrician of the company, states that there is no belt slippage evident and that the "performance has been excellent." The only attention has been the application of a slight amount of melted tallow to the chrome strips about once every three weeks.

Prolonging the Life Of Mine Cables

Some useful hints on the installation and maintenance of underground power cables are offered by W. E. Warner, of Brentford, England. Cables used in mining, including the lead-sheathed type, are exposed to the attacks of destructive agents, such as moisture, corrosion, stresses and mechanical injury—any or all of which many occur when the cables are not hung or supported properly. Decomposition may be either chemical or electrolytic, the latter action being due to stray currents or to local action between the lead and some nearby electrically opposite body.

A lead sheath has a high resistance to corrosion, partly by reason of the

formation on its surface of an oxide film. This corrosion-resisting property largely depends on the composition of the sheath, the highest resistance being given by an alloy of lead and tin (about 2 per cent), next, by pure lead and lastly by an alloy of lead and antimony. Impurities in the sheath material also favor corrosion.

Cables should be installed in a position that will avoid destructive action. Theey should not be placed where they will come in contact with water, which contributes to electrolytic decomposition. Decomposition due to this cause may be minimized by thorough grounding of the sheath and by maintaining the electrical insulation of the entire plant in good condition.

Various paints have been tried as a protective coating for the sheath, in which service aluminum paints have given satisfaction. Sometimes the aluminum paint is thickened by the addition of finely powdered brick dust under the theory that it provides a partial insulating film over the sheath.

The cables should be so suspended as to put the minimum of mechanical stress on the sheath, the support being so arranged as not to cut or chafe the sheath. Where sling supports are used, precautions should be taken against vibration. Vibrations due to resonance are best avoided by making the intervals between supports unequal.

Where ordinary braid-covered cables are used they should be kept painted with shellac varnish applied when the cables are dry and clean. This will protect them from dust and moisture, preserve the insulation and make cleaning easy.

Heavy Shooting Affected Pit Transformers

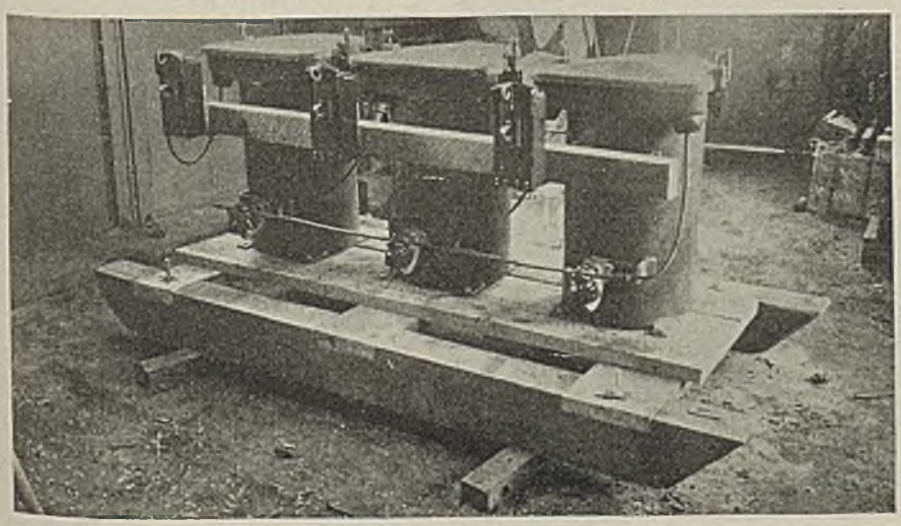
Sled-mounted transformers that supply the pumps, air compressors and so on in a strip pit undergo hard usage. At the Black Servant mine of the Truax Traer Coal Co., Elkville, Ill., it happened at times that the force of a heavy L.O.X. shot, used to shatter the thick limestone cover, would cause the transformers to jump out of the cleats that held them in place on the sled, and would upset them.

The cleats consisted of the side pieces of the shipping crate base which was left under the transformer and nailed to the sled. The transformer case was not fastened down to the platform.

A new arrangement used at this mine is shown in the accompanying photograph, which was made during the construction of a unit in the shop. Four feet, welded to the case at the bottom edge, serve for attaching each transformer to the sled. The primary cutouts and primary connections are supported from the regular suspension hook brackets. The final step in the construction is to build a guard fence around the transformers, with the side next to the primary cutouts made removable.

Each of the transformers shown in the photograph is rated 10 kva., 4,400 volts primary, 440 volts secondary. According to O. D. McNail, chief electrician, fourteen sets of this type are used at the mine.

Feet Lagged to the Sled Prevent Transformers Jumping Off or Tipping



Short Cuts

To save time and labor is the surest way to cut costs in getting out coal. And the best way to sharpen your wits is to use them. If you have figured out a better method of doing a job, a mechanical kink or an electrical problem send it to this department and receive $5 or more. A sketch or photograph will make it clearer.

Tank From Railroad Car Is Steam Accumulator

Exhaust steam from the hoisting engine at No. 1 mine of the Superior Coal Co., Gillespie, Ill., is conserved by utilization in a 500-kw. low-pressure turbine that was added to the original direct-current plant. This turbine operates condensing and its generator supplies alternating current for inside substations, which, however, do not furnish all of the direct current.

In addition to the low-pressure steam from the hoist, exhaust from an engine-driven direct-current generating unit and from the plant auxiliaries goes to the turbine.

The intermittent variations of supply are taken care of by an accumulator consisting of a tank removed from a railroad tank car. It is installed in a room by itself and is completely covered with heat insulation. A back-pressure relief valve to atmosphere limits the pressure to 3 lb. gage.

Bearing Current Appeared On Motor Long in Use

A tendency for current to flow through motor bearings usually is caused by features of design which are difficult to avoid. The common method of preventing the current is to insulate the bearing lining or pedestal from the base or frame of the machine. In many instances machines are thus regularly insulated in the factory. In other cases the first few weeks of operation have shown the need for pedestal insulation.

Unless a ground develops in the windings it is unusual for bearing current to show up after a motor has been in successful operation for some time. But such was the case recently on a large d.c. Ward-Leonard-controlled hoist motor which was installed over five years ago.

One day an inspector noticed that the marks of brush-holder wear on the top brushes indicated that the respective brush-holders had moved away from the commutator. Examination disclosed that the armature had dropped due to excessive bearing wear.

The shaft is 13 in. in diameter, the air gap is large, and the motor runs at less than 100 r.p.m.; therefore it was possible to continue operation with the badly worn bearing. Measurements taken frequently during the next week with a feeler gage showed a bearing wear of $\frac{1}{16}$ in. during that period. Tests which indicated a maximum potential of 0.7 volt between the shaft and pedestal led to the conclusion that current was causing the wear.

This seemed peculiar inasmuch as the pedestal is mounted on concrete instead of on a motor bed plate. Of course there is the chance that the pedestal bolts are electrically connected to the

motor frame by touching reinforcing bars that may be embedded in the foundation.

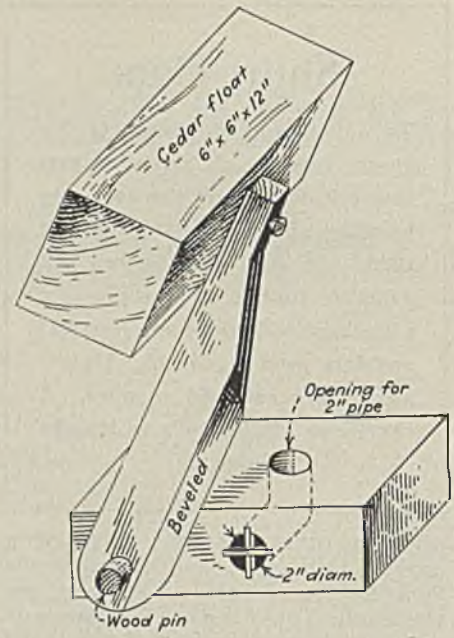
A new bearing was installed and is now operating without showing more than normal wear. The only change was to insert insulating sections in the piping that serves the bearing.

Acid-Proof Sump Valve Is Made of Wood

A simple inexpensive sump valve made entirely of wood, for use where water is highly acid, has been developed by Walter Miller, pumpman at the No. 7 mine of the Consolidated Coal Co. of St. Louis, Herrin, Ill. This idea was submitted by Robert Bowie, superintendent of this mine.

Details of this valve are shown in the accompanying sketch. The size of the block used may be varied according to the size of the suction pipe. The lever to which the float is attached is beveled on the outside edge and serves as a scraper for cleaning off any accumulation of drift or heavy matter that might be drawn to the suction hole. The small bars across the hole prevent large pieces of this accumulated matter from being drawn into the pipe.

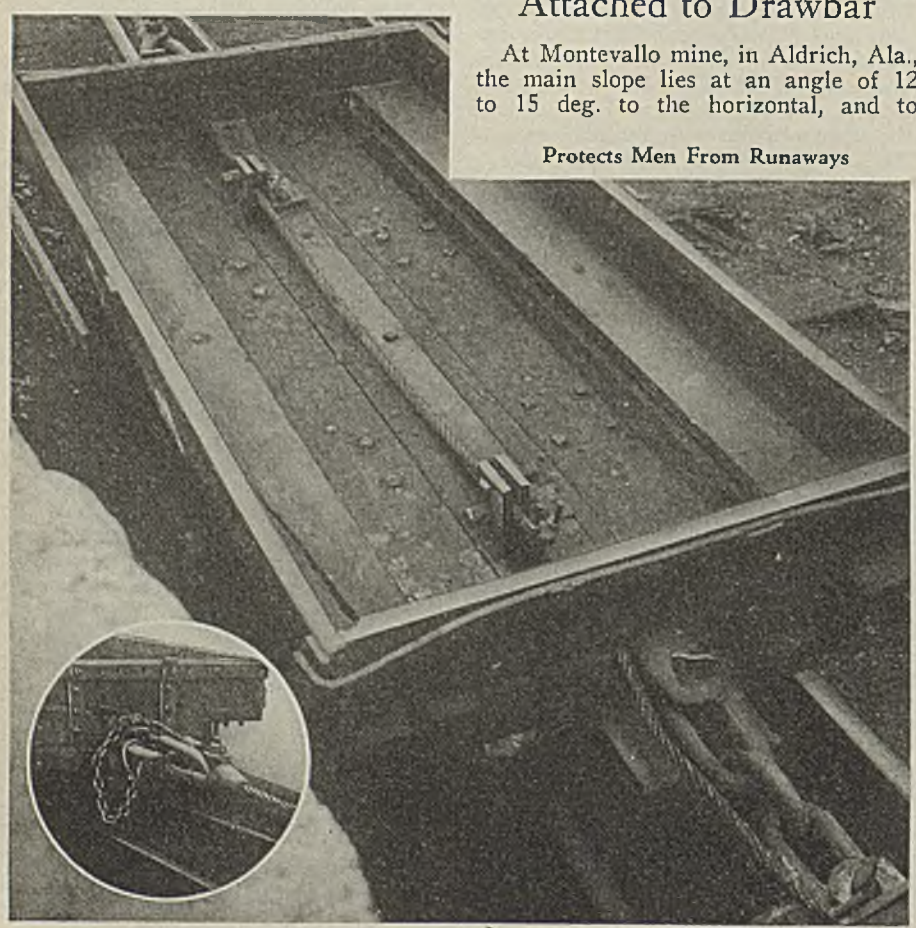
This valve can be made in a few minutes. It has been in service for only a comparatively short time in No. 7 mine, but as it has shown no signs of failure and as it is based on the fundamentals of a more complicated design of valve which has served satisfactorily for a long time, the practicability of the valve here presented is reasonably assured.



Showing Valve Construction

Car Protected by Rope Attached to Drawbar

At Montevallo mine, in Aldrich, Ala., the main slope lies at an angle of 12 to 15 deg. to the horizontal, and to protect the mine car against runaways a subsidiary rope is attached to the main rope socket and passed through the man car from end to end. Two clamps riveted to the drawbar of the car are tightened on the rope so that it cannot get away. Thus the men are well protected against the risk of the chains becoming uncoupled, as too often happens when there is no such protection, especially when the car travels over a knuckle.

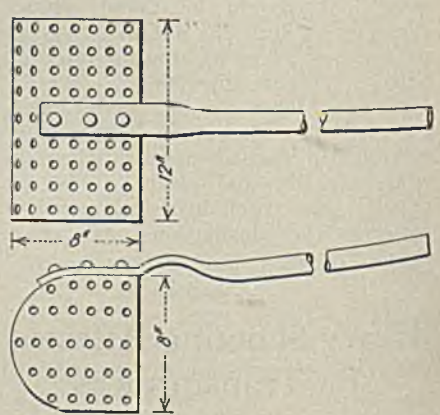


Protects Men From Runaways

Ease Sump Cleaning With Screen Plate Basket

Considerable trouble often results when water is pumped from creeks, due to accumulations of leaves, brush, paper, ashes, fine dust, coal or mud around the pump strainer, according to Charles W. Watkins, Kingston, Pa. To eliminate the use of flush gates, chutes or buckets and shovels in cleaning out the sumps the hoe or cleaning basket shown in the accompanying sketch is proposed.

Regular bronze perforated screen plate, such as is used to sieve the smaller sizes of coal, is all that is required for the basket and the handle is made of ¾-in. pipe. The shape of the basket is about the same as that of an ordinary elevator bucket, the pipe handle being riveted or bolted on. It may often be used to remove rubbish while the pump is running and obviates the necessity of draining the sump or resorting to shoveling or dipping out the refuse.



Recommended for Easy Sump Cleaning

Magneto Test Results May Mislead

Magnetos are used extensively for testing electrical equipment and circuits for faults. It is possible, however, according to *Power*, March 12, 1929, for a magneto to indicate a dead ground when the circuits are insulated in a proper manner.

"A high-resistance magneto will ring

through a comparatively high insulation resistance and this will lead to wrong conclusions. Then, again, if a magneto is used to test a large machine or a long cable, it may ring when the insulation is in good condition. In this case the equipment acts as a condenser. The magneto generates an alternating voltage and charges the equipment first in one direction and then in the other, just the same as when connected to the terminals of a static condenser. This charging current for large machines is sufficient to ring the magneto's bell.

"Another case where misleading results may be obtained is when a magneto is used on a circuit of high inductance. The inductance of the circuit may prevent sufficient current flowing to ring the magneto and thus give an indication of an open when the circuit is complete."

New Method of Conducting Power at Strip Pit Eliminates Pole Lines

A NEW METHOD of conducting 4,000-volt power to stripping shovels, now in use by the Northern Illinois Coal Corporation, Wilmington, Ill., is a distinct improvement from the standpoints of operating cost, safety and minimum trouble. Pole lines which had to be moved or shortened at frequent intervals are displaced by a steel armored cable lying on the ground.

This cable is kept parallel to and approximately 100 ft. to 200 ft. distant from the advancing face of the pit. About every 1,000 ft. plugging-in boxes are permanently connected in the cable circuit. The strip-shovel trailing cable is plugged into one station and then into the next as the machine advances along the pit.

At Wilmington seven 1,100-ft. lengths of three-conductor No. 4/0 spiral-wire-armored rubber-insulated cable are used to serve the 7,000-ft. pit. There is a cable station at the far end and one at the end of each length. Keeping the stations spaced about 1,000 ft. apart leaves nearly 100 ft. of slack, which feature facilitates the moving of the stations and connecting cables.

This moving is done without disconnecting the cable sections. With a team of horses a sled-mounted station is dragged as far as the cable slack will permit and then the cable between stations is moved by the same method. The hitching used on the cable is a curved piece of steel which prevents sharp bending. Where obstructions such as stumps do not interfere, the team can be driven at an angle and the cable will slide through the hitching so that it can be moved without making a series of pulls.

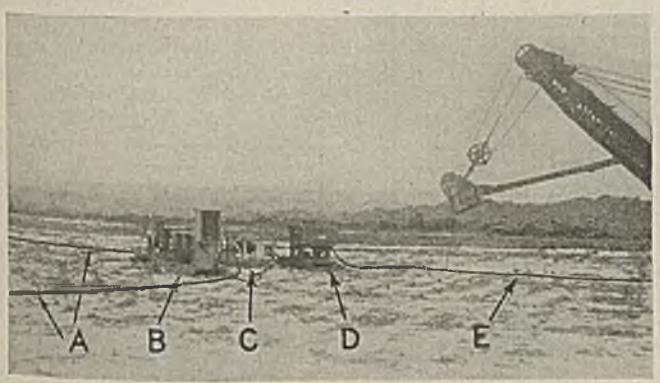
Four plugging-in receptacles are provided for each cable station and the rating is 4,500 volts, 200 amp. The plugs are bolted in place when connected. They are air break, so are pulled or connected only when the load has been cut off the plug cable. The receptacle contacts, which are live at all times, are protected by being located well back from the receptacle openings.

At the receiving end of the 4,000-volt strip-shovel trailing cable is a sled on which is mounted an oil switch and fused disconnects. For the coal-loading shovels, pumps and air compressors, all of which operate on 440 volts, sled-mounted transformers are used at the cable station.

The load on the No. 4/0 main cable shown in the accompanying photographs is made up of one 800-hp. 12-yd. shovel, one 435-hp. 6-yd. dragline, one 85-hp. 2-yd. coal loader and about 100 hp. in pump and air compressor motors. The

Supplying the 12-Yd. Stripper

"A" is main cable; "B," transformer sled; "C," main cable station; "D," stripper oil switch; "E," rubber covered trailing cable to stripper.



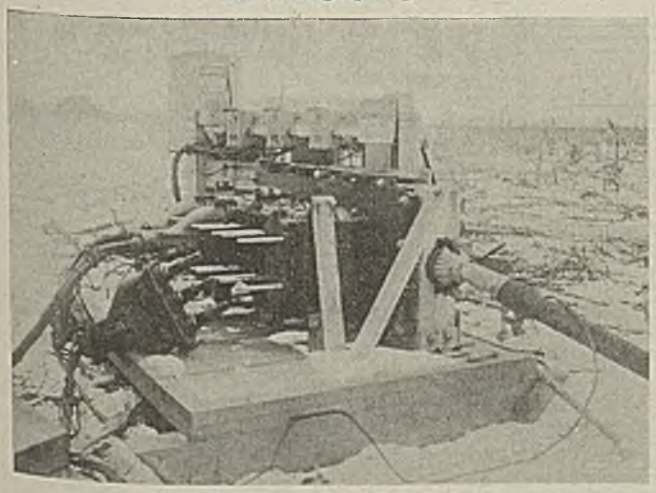
* * *

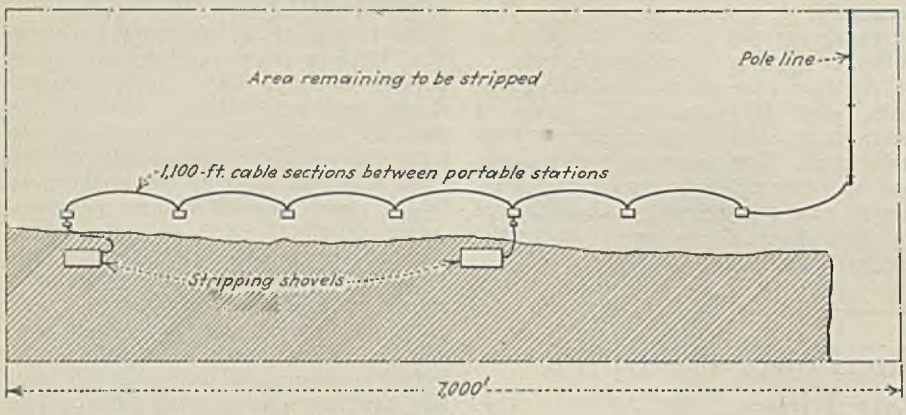
Cable Station With a Plug Removed for Photographing

Curved Hitching Prevents Kinking Main Cable When It Is Dragged Sidewise

* * *

Main Station, and at the Right the Terminal Sled of the 4,000-Volt Stripper Cable





The Main Cable Lies Parallel to the Pit

installation was designed for 10 per cent voltage regulation with a 300-amp. load and 10,000 ft. of cable.

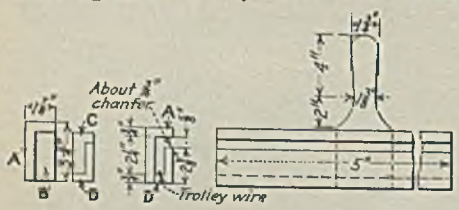
For safety, all metallic parts of the cable station and of the switch and transformer sleds are grounded to the wire armor of the main cable. Ground wires of bare stranded copper are included in the short cables connecting the oil switch and transformer sleds to the main cable station. At the receiving end the armor of the main cable is connected to the pole-line ground wire, which in turn leads to a neutral point of the transformers at the substation, which has a positive ground.

In addition to the apparent operating advantages of the cable system, it has a lower first cost than a pole system with main line and laterals adequate for stripping a large area.

R. S. Weimer, general superintendent, suggested the cable installation and J. C. Rettenmayer, chief electrician, worked out the electrical details.

Movable Guard Protects Workmen Under Wire

In the March 9 issue of *Engineering and Mining Journal* appears a design for a trolley-wire guard, used by the Old Dominion (Copper) Co., Globe, Ariz., for temporary protection of men working under trolley wire. The virtue

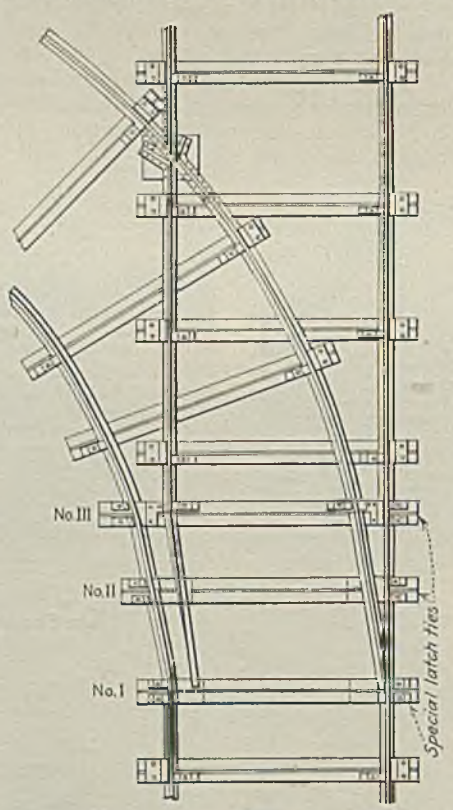


Details of Trolley Wire Guard

of this guard is that it can be attached by a workman without exposing him to the danger of making contact with the wire. As shown in the accompanying sketch, it is made from a single piece of 2x4-in. lumber 5 ft. long. The piece is first sawed into sections *A* and *B*; section *B* is sawed to give sections *C* and *D*; then sections *A* and *D* are put together as indicated to form the finished slotted guard. The handles (two) of the guard are ¾x3½x10 in. and are attached so as to leave about 2½ ft. between centers.

Use Specially Made Ties For Steel Tie Switch

To avoid the necessity of using wooden ties under the latches in laying a temporary steel-tie room switch with



Smooth Running Over This Switch

consequent raising of the latches above the rest of the track, F. J. Andrews, of the Consolidation Coal Co., Fairmont, W. Va., advocates the use of special ties for this purpose. A typical switch laid on steel ties is shown in the illustration.

The specially made ties are shown in position and it will be noted that they are longer than the ordinary variety and have special lugs or clips as well as slide plates for the latches to work on. Room switches may be quickly laid, and the humps which impede motor operation are absent. These humps result from the use of wood ties in the steel tie track.

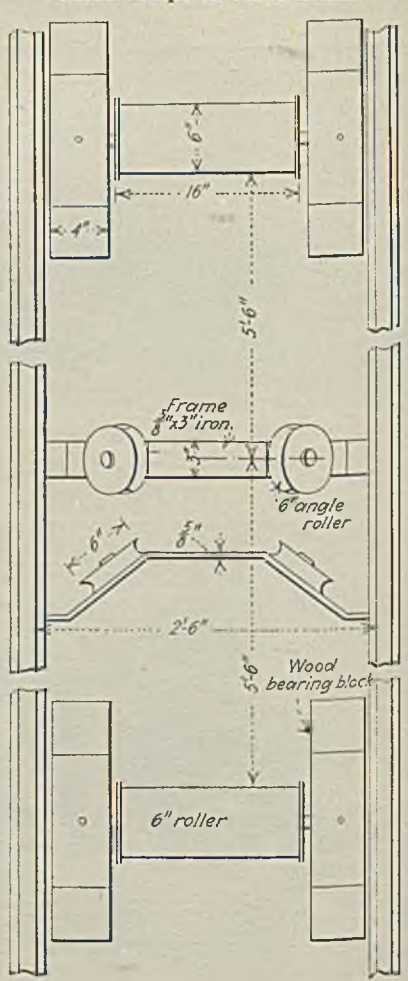
Rope Winds Evenly on Auxiliary Rollers

Keeping the rope in the center of a slope track near the hoisting drum has been accomplished by the use of auxiliary pulleys, according to M. W. Medill, Reliance, Wyo. A sketch of the layout accompanies this description.

Two 16-in. rollers are required. The rolls of the rollers are 8 in. in diameter with holes in the center to fit over a 1⅛-in. pipe which is used as a bearing. Six-inch pipe is used for the roller, the whole being welded together. The bearing axle is made of mild steel and works in wood bearings. Six-inch scrap side rollers are used for the angle rollers. These work on a pin turned out of shafting and drilled for lynch pin and oil holes.

The layout as shown is placed far enough ahead of the hoist to take the rope as it comes to center. With the assistance of the rollers the rope will coil evenly on the hoist drums.

Centers Rope on Hoist Drums



WORD *from the* FIELD

Two Pittsburgh Companies Reduce Wage Rates

Wage reductions averaging 7 per cent were announced April 18 by the Pittsburgh Coal Co. and Carnegie Coal Co. Both companies also announced they had cut the price of staple commodities in company stores 10 per cent. The Pittsburgh Coal Co. has about 9,000 men employed. J. D. A. Morrow, president of the Pittsburgh Coal Co., said the company had been compelled to reduce its wage scales to meet competition of West Virginia companies, which had cut wages three times since Jan. 1. The last previous wage cut by this company was in January, 1928.

Technical adjustments in the scale relative to payment for dead work and yardage made it difficult for Mr. Morrow to state what the flat tonnage rate would be, but he said the average reduction in pay was about 7 per cent. In some mines, he stated, four different scales are paid for loading coal—46, 48, 51 and 54c. a ton. The average maximum wage for inside day labor has been cut from $5.40 to $5.04 a day. For outside day labor the minimum wage was reduced from $4.08 to $4. The minimum inside day-labor rate was cut from $4.72 to $4.64.

A new system is being tried by the company, whereby instead of having the loader lay his own track and drill the holes for blasting the company has gangs perform these operations. The loader's tonnage pay rate has been reduced proportionately. Comparative rates paid in various fields are as follows:

Operators Launch Campaign To Popularize Ohio Coal

E. W. Smith, head of the State Department of Mines and Mining of Ohio has been selected chairman of a special committee to confer with coal operators relative to a financial program for carrying on a campaign to popularize the use of Ohio coal. The committee was named following a conference of coal operators and heads of departments at Ohio State University which was held April 23. The conference was called by Will T. Blake, head of the Department of Industrial Relations of the state government.

At the conference operators representing 90 per cent of Ohio's production attended and unanimity of purpose was shown. Other members of the committee are W. E. Tytus, president of the Sunday Creek Coal Co.; George M. Jones, Jr., Toledo, of the Ohio Collieries Co.; J. Emery, president of the Cambridge Collieries Co., Cambridge; H. L. Findlay, vice-president of the Youghiogheny & Ohio Coal Co.; R. L. Ireland, general manager, Wheeling & Lake Erie R.R., and H. E. Nold, head of the department of mining engineering, Ohio State University. Among those in attendance at the conference were Professors Nold, J. L. Demorest, of the Department of Metallurgy; Wilber Stout, Ohio State Geologist; C. A. Hitchcock, director, and J. L. Weed, assistant to the director of the Engineering Experiment Station.

Analyses of various seams of Ohio coals are to be made and compared with those of coals from other states and a campaign to inform the public will be carried on.

Wider Spread in Lake Rates Asked by Pittsburgh Mines

Coal operators of western Pennsylvania have asked the Interstate Commerce Commission to reopen the lake cargo rate case, seeking a higher differential over Southern producers than the 35c. agreed upon some months ago. A petition was filed April 22 by the Western Pennsylvania Coal Traffic Bureau asking that rates of $1.91 per ton be fixed on shipments of high-volatile coal and $2.06 on low-volatile coal from Southern mining fields for lake cargo loading.

The present rate on high-volatile coals moving from Southern mines for lake shipment is $1.81, which became effective through a compromise agreement between Northern and Southern railroads following an attempt to cut the rate from $1.91 to $1.71 to meet a 20c. reduction by the Northern carriers. When the 20c. cut by the Southern roads was disallowed by the Interstate Commerce Commission the matter was taken to court, and the U. S. District

Wage Scales in Various Bituminous Coal Fields

	Pittsburgh Coal Co.	Northern W. Va.	New River		Somerset County							Central Pennsylvania (Excluding Somerset)					
Item	Thin, April 16, 1929	Thick, April 16, 1929	Nov. 1, 1927, Scale	Adjusted Scale	Consolidation Scale Oct. 1, 1927	Hillman C. & C. Scale	Davis C. & C. Scale Aug. 16, 1928	Cambria Fuel Scale	Quemahoning Coal Co. Scale June 1, 1928	Knickerbocker Fuel Scale, April 1, 1929	Phila. Scale, July 1, 1927	Nov. 1, 1917, Scale	Berwind-White Scale, April 8, 1926	Erie Mines Scale April 16, 1929	B. R. & P. Scale	Allegheny River Scale on $2 Selling Price
Rates per Net Ton																
Car pushing						$0.0446					$0.0446	$0.0446	$0.0446	$0.04		$0.044
Pick mining	$0.76	$0.71	$0.52	$0.5911	$0.50	$0.7813*	0.7143	$0.6250	$0.5804	$0.6696	$0.7054	0.9031	0.9031	0.9018	0.86	$0.9400	0.90
Machine loading	0.52	0.47	0.38	0.4732	0.425† 0.575‡	0.5804*	0.5357	0.4464	0.4911	0.4464	0.4911	0.5785	0.5785	0.5982	0.58	0.6400	0.58
Cutting and scraping	0.10	0.03	0.09	0.1071	0.075	0.0982	0.0982	0.0893		0.0982	0.0893			0.1250	0.10		Variable
Rates per Day																	
Motormen		5.20	4.80			4.76	4.60	4.16	4.88	4.00	4.24	6.10	5.10	6.30	5.00	6.10	5.11
Spraggers		5.04	4.40			4.48	4.35	3.92	4.50	3.76	4.00	6.00	5.00	6.00	4.80	6.00	5.00
Skilled wiremen		5.04			4.48	4.48		3.92				6.00	5.00	6.30	5.00	6.00	5.00
Tracklayers		5.12				4.76		4.16		4.00		6.00	5.00	6.00	5.00	6.00	5.00
Bottom cagers		5.04										6.00	5.00			6.00	
Drivers		5.04	4.40	4.68		4.48		3.92	4.50			6.00	5.00			6.00	
Timbermen		4.96				4.76		4.16			3.76	6.00	5.00	6 00	5.00		5.00
Cutters								4.88				6.10	5.10	6.45			5.11
Scrapers								5.16				5.85	4.85	6.25			5.00
Helpers		4.64	3.76		3.60	4.00		3.92		3.60		5.77	4.77	5.45	4.56		
Other inside labor		4.64	3.76	4.16		4.00	3.75	3.20	3.60	3.20		5.77	4.77	5.45	4.56	5.77	4.72
Dumpers		4.96	3.76		3.36	3.76	3.75	3.04	3.60	3.20		5.42	4.42		4.40	5.64	4.44
Trimmers and couplers		4.00				3.08		3.04			2.56	5.36	4.36		2.56	5.49	4.00
Firemen—8 hrs.						3.28		3.68				5.60	4.60			5.63	
Pumpers						3.36		2.88							4.80		4.72
Blacksmiths		5.60	5.36			5.12		4.16		4.00	4.24				5.00		5.56
Other outside labor		4.00	3.60	4.00	2.96	2.80	3.35	2.40	3.20	2.80					4.00		3.89

*Includes $0.0357 car pushing. †Narrow. ‡Wide.

Court for the Southern District of West Virginia enjoined the action of the Commerce Commission. The U. S. Supreme Court refused to render a ruling, holding that moot points were involved and that the compromise agreement made action by the high court unnecessary.

Coming Meetings

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.

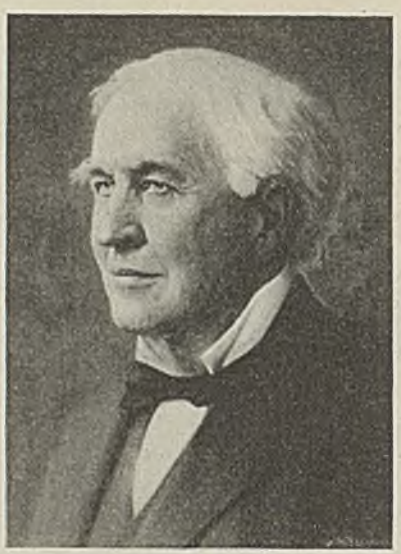
Oklahoma Coal Operators' Association; annual meeting, Sept. 3, at McAlester, Okla.

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.



Thomas A. Edison

Tributes are pouring in on the Wizard of Menlo Park in recognition of the fiftieth anniversary of his invention of the incandescent lamp. Leaders in science and industry are taking part in the observance of light's golden jubilee, which was launched late in April and will reach a high point in June at the convention of the National Electric Light Association at Atlantic City, where a world's fair of modern lighting, involving a marvelous illumination of city, sky and ocean, will be inaugurated and continue throughout the summer.

Various events throughout the summer and early autumn will keep attention focused on the jubilee. On Oct. 21, birthday of light, the jubilee will reach its climax at Dearborn, Mich. Here the scence of Edison's early labors at Menlo Park has been reproduced by Henry Ford, and on that night the Wizard will repeat the original experiments which marked the birth of the successful electric lamp. The exercises will be broadcast by radio to all parts of the country and perhaps overseas.

Locomotive Shipments Show Increase

Shipments of mining and industrial electric locomotives for the quarter ended March 31, 1929, as reported to the Department of Commerce by nine firms, comprising practically the entire industry, were 207 valued at $1,248,071, as against 184 locomotives valued at $1,149,678 for the quarter ended Dec. 31, 1928, and 133 valued at $728,629 for quarter ended March 31, 1928. Comparative figures are as follows:

	Grand Total		Mining Locomotives				Industrial Locomotives			
			Trolley Type		Storage Battery Type		Trolley Type		Storage Battery Type	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
1927										
Quarter ending:										
March 31	283	$1,372,225	202	$985,659	70	$257,701	4	$47,500	7	$81,365
June 30	233	1,053,812	153	732,851	56	235,116	9	51,025	15	34,820
September 30	193	898,970	129	640,092	48	156,696	6	41,659	10	60,523
December 31	173	866,106	102	508,599	52	155,497	2	50,000	17	152,010
Annual total	882	$4,191,113	586	$2,867,201	226	$805,010	21	$190,184	49	$328,718
1928										
Quarter ending:										
March 31	133	$728,629	81	$487,173	42	$109,998	1	$10,545	9	$120,913
June 30	111	729,458	68	333,648	30	88,845	6	148,937	7	158,028
September 30	141	860,305	71	372,644	50	137,145	14	219,716	6	130,800
December 31	184	1,149,678	104	524,303	65	181,823	11	416,887	4	26,665
Annual total	569	$3,468,070	324	$1,717,768	187	$517,811	32	$796,085	26	$436,406
1929										
Quarter ending:										
March 31	207	$1,248,071	124	$614,924	56	$174,945	222	$437,702	5	$20,500

Anthracite Shipments Lower in March

Shipments of anthracite during March, 1929, as reported to the Anthracite Bureau of Information, Philadelphia, Pa., amounted to 3,628,691 gross tons. This is a decrease as compared with shipments during the same month last year, of 546,791 tons, and falls short, when compared with the preceding month of February, this year, 1,539,506 tons.

Shipments for the coal year ending March 31, 1929, totaled 61,314,046 tons, as compared with 61,275,008 tons during the preceding coal year, showing an increase of 39,038 tons. Shipments by originating carriers for the month of March, this year, compared with the same month last year, and the preceding month this year, are as follows:

	March 1929	March 1928	February 1929
Reading Company	676,295	777,654	946,327
Lehigh Valley	583,014	611,373	798,683
Central R.R. of New Jersey	308,049	507,542	478,611
Dela., Lackawanna & Western	626,825	705,243	907,532
Delaware & Hudson	489,840	497,457	732,780
Pennsylvania	345,147	373,427	447,258
Erie	375,165	448,581	543,287
N. Y., Ontario & Western	82,802	122,059	129,082
Lehigh & New England	141,554	132,146	184,637
	3,628,691	4,175,482	5,168,197

Open Preparation Plant

The Yolande-Connellsville Coal Corporation completed and placed in operation early in April a large and modern washery and preparation plant at its Connellsville mine, in Tuscaloosa County, Alabama. The plant was designed for an ultimate capacity of 2,000 tons daily and elevators, bins, etc., have been provided to handle this tonnage, but only a portion of the equipment has been installed for present use. When completely equipped the plant will have five jigs and four picking tables and the additional washing and preparation machinery will be installed as the need develops. The opening is a new one and production has not reached a large tonnage as yet. The general offices of the company are located in Birmingham, Ala.

Courses for Executives

Courses in the interpretation of financial statements, bank management, public-utility management and economics, railway transportation, sales management and trust management will be given this year in the second special session for business executives by the Graduate School of Business Administration, George F. Baker Foundation, Harvard University. The session will be from July 1 to Aug. 10. In the five courses offered at the first session, last summer, 172 business men and 8 teachers of business subjects enrolled. The executives attending came from 95 different companies in 26 states.

Progress of Mechanization Is Theme Of Cincinnati Convention

IMPROVED methods and processes in the production of coal which are expected to add materially to the advance of the industry in safer, more efficient and profitable operation will feature the program of the Sixth Annual Convention of Practical Coal Operating Men, under the auspices of the Manufacturers' Division of the American Mining Congress, which will open May 13 at the Music Hall in Cincinnati, Ohio, and continue until the 17th. Supplementing the addresses and discussion there will be an exposition of mining machinery, equipment and supplies in which more than 100 companies will be represented. The program was arranged by a committee headed by Paul Weir, vice-president, Bell & Zoller Coal & Mining Co., Chicago.

Mechanization, recent developments in the various coal fields and mine safety will be the main themes around which the convention sessions will revolve. The annual dinner will be held Thursday evening, May 16, several luncheon-business meetings will be held by the board of governors and other social diversions will be provided. A dinner conference will be held in the evening of May 15 to consider measures to interest college students in the courses in mining engineering at the various mining schools. Officials of the Bureau of Mines and officers of the American Institute of Mining & Metallurgical Engineers have been asked to participate in this meeting in the interest of advancing mining engineering education for selection by students in choosing a profession.

The first session, in the afternoon of May 13 will be devoted to consideration of coal-mine mechanization under the auspices of the national committee on mechanized mining recently created by the American Mining Congress.

The presiding officer will be Otis Mouser, Philadelphia, Pa., president of the Stonega Coke & Coal Co., and the speakers will be Dr. L. E. Young, of Pittsburgh, vice-president of the Pittsburgh Coal Co., and chairman of the national committee on mechanized mining, whose subject will be mechanized mining at the advent of 1929; Glenn B. Southward, mechanization engineer of the American Mining Congress, on the practical application of mechanization in coal production; F. G. Tryon, chief of the statistics section of the Coal Division of the U. S. Bureau of Mines, who will present statistics on mechanical mining, and a paper by Prof. J. A. S. Ritson, of the department of mining of the University of Leeds, England, on the trend of mechanized mining in the British Isles.

J. B. Warriner, Lehigh Coal and Navigation Co., Lansford, Pa., will preside in the morning of May 14, when the discussion will relate to anthracite mining. Addresses will be made by H. D. Kynor, manager, Northumberland Mining Co., of Excelsior, Pa., on recent developments in anthracite mining; Cadwallader Evans, general manager, Hudson Coal Co., of Scranton, on coal cleaning at the Marvine Breaker of that company; E. P. Humphrey, general manager, Hazle Brook Coal Co., Jeddo, Pa., on rock gangways under heavy pitch; Robert Bazley, contracting engineer, Pottsville, on anthracite stripping; J. Latimer Lee, mining engineer, Susquehanna Collieries Co., Cleveland, on rock disposal in the anthracite field.

Developments in mining methods in Western states will be considered at the afternoon session, May 14. The presiding officer will be H. N. Taylor, president of the United States Distributing Corporation, and the speakers will include D. A. Stout, chief engineer of mines, Colorado Fuel & Iron Co., of Pueblo, on recent developments in Colorado, Wyoming, New Mexico, Utah and Montana; George Watkin Evans, consulting coal mining engineer, Seattle, Wash., on methods of mining coal in pitching seams; Edward Bottomley, general superintendent, Sheridan-Wyoming Coal Co., of Kleenburn, Wyo., on the mining system of that company, covering drilling, cutting, shooting, loaders, roof action and timbering; W. D. Brennan, manager, Stag Canon branch, Phelps Dodge Corporation, Dawson, N. M., on the system used in handling labor employed by the Stag Canon Fuel Co.; L. D. Anderson, chief engineer, United States Fuel Co., of Salt Lake City, Utah, on the power plant of the company; J. E. Edgeworth, Union Pacific Coal Co., Rock Springs, Wyo., on longface mining with shaking conveyors and universal duckbills at the mines of the company.

J. B. Pauley of Chicago, chairman of the board of the Miami Coal Co., will preside at the morning session May 15 when the following speakers will deliver addresses: David Ingle, Oakland City, Ind., president and treasurer, Ayrshire Coal Co., on developments in mining methods in Illinois, Indiana and western Kentucky; Wm. P. Young, assistant general superintendent, Bell & Zoller Coal & Mining Co., Zeigler, Ill., on the mining system of that company, covering drilling, blasting, loaders, roof control, timbering, etc.; H. A. Treadwell, chief engineer, Chicago, Wilmington & Franklin Coal Co., Orient, Ill., on the maintenance and inspection system employed by that company; R. S. Walker, engineer, M. A. Hanna Co., Cleveland, Ohio, on coal cleaning methods at the mines of the company, and Roy Adams, chief engineer, Old Ben Coal Corporation, Christopher, Ill., on longface mining operations by the company.

At the afternoon session May 15 the speakers will be D. A. Thomas, Birmingham, Ala., president and treasurer, Montevallo Coal Mining Co., on recent developments in mining methods in southern West Virginia, Virginia, eastern Kentucky, Tennessee and Alabama; C. P. Anderson, chief of Labor department, New River Co., MacDonald, W. Va., on the training of men to become mine foremen and superintendents; L. B. Abbott, division engineer, Consolidation Coal Co., Jenkins, Ky., on the mining system of the company; R. M. Watt, district manager, Kentucky Utilities Co., Pineville, Ky., on power problems in relation to bituminous production and Lee Long, general manager, Clinchfield Coal Corporation, on coal-cleaning methods by that company.

At the safety session on the morning of May 16, Dr. L. E. Young will speak on eliminating hazards in mechanical loading; Thomas G. Fear, manager of operations, Consolidation Coal Co., Fairmont, W. Va., on the work of the safety court maintained by the company; J. A. Saxe, chief engineer, Ellsworth (Pa.) Collieries Co., on modern mine ventilation, including the use of altimeters, and C. L. Lutton, director of safety, H. C. Frick Coke Co., Scottdale, Pa., on underground safety inspections.

W. L. Robison, vice-president of the Youghiogheny & Ohio Coal Co., Cleveland, Ohio, will preside at the afternoon session May 16 at which addresses will be made by H. W. Showalter, president, Continental Coal Co., Fairmont, on developments in mining methods in bituminous mines in Pennsylvania, Ohio and northern West Virginia; E. J. Christy, superintendent, Wheeling Township Coal Mining Co., Adena, Ohio, on the mining system of that company; Newell G. Alford, of Howard N. Eavenson & Associates, mining engineers, Pittsburgh, Pa., on economies in longer mine haulage; J. E. Newbaker, general manager, Berwind-White Coal Mining Co., Windber, Pa., on the drainage and pumping system employed in the Windber field by the company, and E. K. Davis, electrical superintendent, Peale, Peacock & Kerr, St. Benedict, Pa., on the cleaning of bituminous coal.

J. G. Puterbaugh, of McAlester, Okla., president of the McAlester Fuel Co., will preside over the concluding session the morning of May 17, at which V. C. Robbins, chief engineer of the company, will speak on longwall conveyor mining in the Arkansas field.

Producing Companies Issue Financial Reports

The New River Co. reports consolidated net income of $390,109 for the year ended Dec. 31, 1928, after all charges, taxes and bond interest, equal to $5.37 a share on $7,256,800 of 6 per cent cumulative preferred stock outstanding, on which back dividends total $43.50 a share, as compared to $340,877, or $4.69 on the preferred in 1927.

The American Coal Co. of Allegany County reports for the year ended Dec. 31, 1928, net income of $197,676 after depreciation, depletion and federal taxes, as compared to $290,868 in 1927.

The Hatfield-Campbell Creek Coal Co. reports that net earnings for 1928, after provision for federal income taxes, depletion reserves and depreciation, were $326,322.71, compared with $316,321.83 in 1927.

Net income for 1928 of the Island Creek Coal Co. was $2,889,991 after depreciation, depletion and taxes, equivalent, after preferred dividends, to $4.46 a share earned on 593,865 shares of common stock. This compares with $3,611,407, or $5.64 a share, in 1927. For the first quarter of this year net profits were $818,154 after depreciation, depletion and federal taxes. This is equal after dividend requirements on the $6 preferred stock to $1.28 a share on the common shares and compares with net income of $679,075, or $1.03 a share in the first quarter of last year.

The Lehigh Valley Coal Corporation for the quarter ended on March 31 shows consolidated net income of $468,328 after interest, depreciation, depletion, federal taxes and other charges, equivalent, after allowing for dividend requirements on the 6 per cent preferred stock, to 26c. a share on the 1,182,687 no par shares of common stock. This compares with $99,336, or 45c. a share on 217,448 shares of 6 per cent preferred stock, in the first quarter of 1928.

The Cosgrove-Meehan Coal Corporation for 1928, reports consolidated net earnings of $133,911 after interest, depreciation and depletion, equivalent to 57c. a share on the outstanding stock. This compares with $71,806, or 31c. a share, in the preceding year. Sales in 1928 were 3,152,418 tons against 2,635,080 tons in 1927.

The Clinchfield Coal Corporation reports for 1928 net loss of $249,588.81 after fixed charges. This compares with a net income of $122,547 in the preceding year.

The Pennsylvania Coal & Coke Corporation reports for the year ended Dec. 31, 1928, consolidated net loss of $524,643, after depreciation, depletion and estimated federal taxes of subsidiaries, compared to a loss of $793,747 in 1927. For the quarter ended March 31 profit was $4,245 after ordinary taxes, depreciation and depletion but before federal taxes. This compares with a net loss of $235,707 in the first quarter of 1928.

The Dominion Coal Co., Ltd., subsidiary of the British Empire Steel Corporation, reports for the year ended Dec. 31, 1928, net loss of $303,183 after depreciation, depletion, interest, sinking funds, etc., as compared with net profit of $988,254 in 1927.

The Electric Shovel Coal Corporation (Indiana) reports for the year ended Dec. 31, 1928, net income of $316,719, after royalties, depletion, depreciation, interest on mortgage bonds and federal taxes.

Germans and Americans Join In New Combine

A new company to be known as the American I. G. Chemical Corporation is to be formed in this country by leaders in the chemical industry in Germany in association with a number of outstanding American financial and industrial men. Among those who are taking an active interest in the formation of the company are Charles E. Mitchell, chairman of the National City Bank; Edsel Ford, president, Ford Motor Co.; Walter Teagle, president, Standard Oil Co. of New Jersey, and Paul M. Warburg, chairman, International Acceptance Bank. The new organization will start business with assets of $60,000,000 and have at its command the brains and resourcefulness that have developed the I. G. Farbenindustrie Aktiengesellschaft, Frankfurt-on-Main, known as I. G. Dyes.

The company has a process for the extraction of gasoline from coal, which it plans to work out on an extensive basis. Other important activities will be in the development and distribution in this country and elsewhere of a wide variety of products, including dyestuffs, pharmaceutical articles, fungicides, organic and inorganic chemical products, solvents and lacquers, light metals, photographic articles and films, artificial silk, synthetic nitrogen fertilizer and other nitrogen products. Mr. Teagle acquired from the German company the American rights to the use of the Bergius patents for the manufacture of gasoline from coal in August, 1927.

Attacks Wage Cutting

Reaffirmation of the labor and operating policy of the Consolidation Coal Co. announced a year ago is made in an advertisement of the company which appeared April 27 in a number of coal trade journals. Incidentally the company takes occasion over the signature of George J. Anderson, president, to fire a broadside at operators who have been "cutting the wages of thousands of miners below a sound economic basis." Coal consumers are urged by the company not to accept the "uneconomic" offerings of "coal guerillas" who are "playing havoc with the coal-purchasing power of today and the fuel supply of tomorrow."

Personal Notes

CHARLES M. MODERWELL, well-known Chicago coal man, now a member of the Chicago, Wilmington & Franklin Coal Co. family, has been elected president of the Union League Club of Chicago.

EVERETT DRENNEN of Charleston, W. Va., who has been prominently identified with the coal industry in West Virginia, was elected a director and vice-president of the Colorado Fuel & Iron Co. on April 24. He was chosen to fill the vacancy caused by the resignation of J. B. Marks.

E. P. FITZGERALD, who was in charge of the sales department of the Sheridan Wyoming Coal Co., during the recent illness of J. Frank Emmert, has been elected vice-president of the company.

Shipments of Bituminous Coal to Great Lakes Ports for Loading Into Vessels as Cargo, Seasons 1921 to 1928, by Districts of Origin

(In Net Tons)

District	1921	1922	1923	1924	1925	1926	1927	1928
Eastern Kentucky	2,624,194	3,091,089	3,297,476	3,514,355	6,606,932	6,933,527	7,178,574	6,651,962
Ohio								
Cambridge	981,997	615,736	954,867	1,005,498	4,381	68,181	1,402	.....
Hocking	668,577	1,288,269	919,927	90,165	115,496	173,953	46,347	25,955
Northern Ohio	208,994	194,608	361,567	57,327	15,704	29,724	.....	4,094
No. 8	3,678,554	1,287,123	3,716,307	2,851,212	1,316,428	1,149,102	298,355	1,022,983
Pennsylvania:								
Altoona and Meyersdale	30,182	81,420	31,316	1,605	1,398	1,875	10,475	.....
Connellsville	*	374,936	468,859	548,327	367,418	598,494	909,405	1,395,443
Northern Pennsylvania	723,819	832,339	1,081,927	482,484	5,096	825,487	145,498	941,320
Pittsburgh	5,907,489	4,002,214	7,977,903	3,249,209	2,106,587	2,506,685	2,547,716	4,293,906
West Virginia								
Cumberland-Piedmont	4,352	676	796	5,146	4,023	3,030	.....	2,903
Fairmont	1,014,514	1,369,969	3,169,505	1,404,159	1,623,499	2,141,924	3,877,170	2,705,011
Kanawha	3,687,136	2,671,251	4,581,656	5,754,567	7,803,062	7,548,932	9,457,380	7,161,826
Moundsville	†	†	†	†	760,614	326,877	728,315	895,010
New River	208,890	271,630	448,566	353,049	396,091	431,301	712,747	620,492
Pocahontas	2,430,559	1,665,556	2,445,507	2,630,625	3,295,537	3,404,807	4,096,952	4,832,800
Thacker-Kenova	190,911	761,962	383,016	977,870	1,794,479	1,595,598	2,099,995	1,827,921
Winding Gulf	.....	.....	.....	.....	.....	280,452	599,870	756,192
Tennessee	3,731	25,667	.....	55,248	17,562	82,629	43,573	42,074
Virginia	.....	43,208	723	202	98,877	59,921	104,519	143,830
	22,363,899	18,577,653	29,839,918	22,981,048	26,333,184	28,162,499	32,858,293	33,323,724

*Included with Pittsburgh before 1922. †Included with Fairmont before 1925. Prepared by F. G. Tryon and R. McKinney, Statistics Section, Coal Division U. S. Bureau of Mines, from figures by Ohio Bureau of Coal Statistics.

Specially Built Powdered-Coal Towboat Passes Test; Will Compete With Oil

FIFTEEN prominent coal operators, principally from the Kanawha field, were aboard the Str. "Dwight F. Davis," the new pulverized-coal towboat, on its first official tryout, which took place on the Kanawha River April 17 at Charleston, W. Va. The trial started from the dock of the Charles Ward Engineering Works, where the boat was built. In the evening one hundred banqueted at the Danial Boone Hotel in celebration of the occasion. The Great Kanawha Valley Improvement Association, of which Ernest M. Merrill, mining engineer and coal operator, of Charleston, is president, arranged the affair.

The boat is the first river towboat designed and built from the bottom up for burning pulverized coal. It is the property of the government owned Inland Waterways Corporation and is to go into service on the Warrior River between Birmingport and Mobile. There it will compete with two other towboats in the same service but using oil as fuel, one a steamer and the other a Diesel-electric.

Dimensions of the boat are: Length, 140 ft., and beam, 25 ft. The draft when carrying a full load of fuel, which is 150 tons, is 7 ft. The engine room looks more like that of an ocean-going vessel than of a river boat. There are two vertical triple-expansion 500-hp. engines direct-connected to 7-ft. propellers that are located in "tunnels" in the bottom of the boat. These engines operate condensing. The normal steam pressure is 275 lb. and the vacuum 26 in.

The fuel, consisting of under-2-in. or smaller screenings, is pulverized on the boat at a rate equaling the rate of combustion. There is no storage of pulverized coal. Air heated indirectly by the escaping flue gas and blown through the pulverizer, dries the fuel somewhat and carries the pulverized coal with it into the furnace. The steaming generating equipment consists of two B. & W. marine-type water-tube boilers each having 2,200 sq.ft. of heating surface and each equipped with its individual pulverizer.

Although the crushing is done by balls, this pulverizer, made by the Fuller-Lehigh Co., is of an entirely new design in that the rotation is imparted to a table on which the coal and balls are carried. It is termed a "table mill." The entire pulverizing equipment weighs but 10,000 lb. per ton-hour of capacity as compared to 25,000 lb. on the "Illinois," a Mississippi River towboat that was converted to pulverized fuel but two years ago. On that boat 18 per cent of the boiler capacity is required for the pulverizing equipment, but on the "Dwight F. Davis" only 6 per cent is required.

Coal from the smokeless field for the test run was donated by the MacAlpin Coal Co. from its mine in the Beckley seam. Preliminary tests indicated a fineness of approximately 86 per cent through 200 mesh, and that 1,500 lb. or more of coal having an ash fusion point above 2,500 deg. F. can be burned per hour in each furnace without slagging. This is a heat release of 75,000 B.t.u. per cubic foot of furnace volume. John Laing, president, and A. W. Laing, general manager of the MacAlpin and associated companies, were among the coal operators riding the boat on the test run.

During the test the boat pulled a large double-deck excursion barge, and an old stern-wheeler towboat followed in its wake. The old boat, although free of load, was rapidly outdistanced when the "Dwight F. Davis" was given full steam ahead.

Speaking at the banquet, at which John L. Dickinson, coal operator and banker, of Charleston, presided, Major General Ashburn, chairman and executive of the Inland Waterways Corporation, said that the unstable price of oil was one of the reasons for making the "Dwight F. Davis" a pulverized-coal steamboat. In the five years of operation of the corporation the price of fuel oil has fluctuated between the limits of 67c. and $1.40 per barrel, or enough to make a difference between profit and loss for a barge line. He stated that a pulverized-coal boat on the Mississippi River is saving approximately $1,000 per month on the fuel cost of an oil-burning steam boat of exactly the same type and operating in the same service. Both of these Mississippi River boats are owned and operated by the Inland Waterways Corporation.

"The epoch-making ride we have enjoyed today brought a new era to this world," said Harry L. Gandy, executive secretary of the National Coal Association. Apparently he sees brighter days ahead for river transportation, for business in general, and for the coal business in particular.

Besides those already mentioned, the following were among the coal men who took part in the boat celebration: P. M. Snyder, Major Lester Ridenour, C. E. Krebs, D. C. Kennedy, Charles E. Sandberg, E. C. Colcord, Josiah Keely, Edward Graff, John C. Cosgrove, F. C. Colcord, C. A. Cabell, Lee Ott, J. E. Hart, Charles C. Dickinson, J. W. Bishop, R. H. Morris, Robert Lambie and E. L. Colcord.

Coal Operators and Others Examine New Boat Before Tryout

New Plant Construction In the Field

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

C. H. Mead Coal Co., East Gulf, W. Va.; contract closed with Roberts & Schaefer for Menzies Hydro-Separator coal-washing equipment, capacity 100 tons per hour, for cleaning egg, stove and pea coal. To be completed July 1.

Glen Alden Coal Co., Scranton, Pa.; second unit, completing the installation of the Rhéolaveur washer in the Loomis Breaker, will be in operation in a short time. Total capacity of breaker, 8,000 tons per day.

Knott Coal Co., Anco, Ky.; contract closed with Roberts & Schaefer for Menzies Hydro-Separator coal-washing equipment, capacity 50 tons per hour, for cleaning egg coal. To be completed July 1.

Lehigh Valley Coal Corporation, Wilkes-Barre, Pa.; contract with the

Koppers-Rhéolaveur Co. for erecting a new breaker, capacity 3,000 tons per day, at the Dorrance Colliery. The Rhéolaveur washery to be installed in the breaker will prepare 400 tons of coal, minus 4½ broken down to No. 4 buckwheat, per hour.

New River Co., Macdonald, W. Va.; contract closed with the Pittsburgh Coal Washer Co. for combined tipple and washery with Pittsburgh jigs for preparing pea, nut and stove sizes. Capacity: tipple, 400 tons per hour, and washer, 150.

New River Co., Macdonald, W. Va.; contract closed with the Pittsburgh Coal Washer Co. for complete tipple equipment, including cages, weigh baskets, shaker screens, loading booms and other items. Capacity, 350 tons per hour.

Stevens Coal Co., Wilkes-Barre, Pa.; contract closed with the Staples-Sweeney Manufacturing Co. for coal washery. Washing equipment: one 15-ft. Chance cone, to cover 800 tons of rice to egg size coal per day from the Cameron bank.

Pond Creek Pocahontas Co. Is Opening New Mine

A new producer to be known as No. 3 slope is to be opened in the McDowell County field of West Virginia by the Pond Creek Pocahontas Coal Co., subsidiary of the Island Creek Coal Co., according to an announcement by James D. Francis, vice-president in charge of operations of both companies. Contracts have been let for the driving of a slope, the sinking of an airshaft and the grading and laying of a railroad siding one mile long, all of which is to be completed about Sept. 1. The mine will produce between 1,800 and 2,000 tons of Pocahontas-seam coal daily.

Glogora Company Will Open New West Virginia Mine

The Glogora Coal Co., of Huntington, W. Va., has purchased a substantial tract of the Dorothy seam coal on the Coal River division of the Chesapeake & Ohio R. R., in Boone County, W. Va. Tentative plans include the construction of a modern steel tipple and a retarding conveyor.

Form First-Aid Association

Employees of the Black Diamond Coal & Mining Co., Drakesboro, Ky., have formed a first-aid association. The new organization was launched at a meeting held April 14 at the theater in Drakesboro. It is hoped that the association, which is self-supporting, will give impetus to the formation of similar organizations throughout the western Kentucky coal field. The officers of the Black Diamond company, who are sponsoring the movement, are James Cardwell, president; W. R. Boxley, vice-president; Van B. Stith, general manager; Robert Rives, secretary, and Glenn Sitz, treasurer.

Organize Mining Institute In Kanawha Valley

On April 13 there was organized at Montgomery, W. Va., the Kanawha Valley Mining Institute, "to promote safety and efficiency in and about mines and to promote good fellowship among the operators and employees and to cooperate with the Department of Mines in its accident-prevention campaign." Meetings are to be held on the second Friday in each month at the rescue station in Montgomery.

Officers are: president, F. O. Harris, vice-president and general manager, Cannelton Coal & Coke Co.; first vice-president, Josiah Keely, president, Cabin Creek Consolidated Coal Co.; second vice-president, J. C. R. Taylor, general manager, Loup Creek Colliery Co.; secretary, C. O. Morris, State Department of Mines, and assistant secretary, William Devaney, assistant auditor, Cannelton Coal & Coke Co.

Court Upholds Lever Law

The Lever Law, which fixed prices of coal during the war, was upheld by a Supreme Court ruling during the week of April 13. The decision denied V. L. Highland the right to recover from the Russell Car & Snow Plow Co. an excess above the price fixed by the government. The plaintiff charged the law was unconstitutional.

Commission Finds Broken Conveyor Caused Kinloch Disaster

(*Continued from page 299*)

that it was unlined. State Mine Inspector McGregor remarked that at the time of his last inspection of Kinloch, in January, no brattice cloth was to be seen in the vicinity of this shop, and that it was in good order.

The only eye witness to the actual breaking of the conveyor was Harvey Rearick, carpenter, who testified that he was taking coal from the moving conveyor for use in his shop when the accident occurred. James Arnold, who was intrusted with the control of the tipple machinery and also the conveyor, said that a stop signal of unusually long duration was sounded a few minutes before the explosion. He could not say whence the signal came. Before he could reach the control panel the explosion took place. Outside Foreman Bryson explained that a boy was employed as an inspector of the conveyor. The inspector was stationed near the drive sprocket of the conveyor and watched the lower strand for defects. On being questioned by Mr. Thomas he said the boy had been on this job one month and that about one-sixth of the time of two repairmen was devoted to the upkeep of the conveyor.

Hunter Crooks, outside mechanic, said that the conveyor as a unit had never been replaced and had been in service about twelve years. He did not think such complete replacement would have been logical or that it would have gained any end. Mr. Crooks stated that shortly after August, of 1928, when he entered the employ of the coal company, the bottom strand of the conveyor was severed and held up operation of the mine for several days. In January, of this year, a break on one side of the conveyor strand occurred, he said. Mr. Jobes testified that the mine had been shut down for a day or more twice in four years prior to this explosion because of conveyor breakdowns.

Harold Raught, repairman, described the design of the conveyor in general terms. The pans rode on wheels and were held and aligned by wheel shafts which engaged double chain links or straps. These shafts were disposed on 18-in. centers, were 10 in. long and 2 in. in diameter. At intervals of 12 ft. through shafts of 2-in. diameter extended across the width of the conveyor. It would be necessary for four links in a line across the conveyor to break before the conveyor parted. The breaking of one of the shafts would not cause the conveyor to open.

Mr. Raught testified that on the night of March 21 he and his partner replaced six or seven defective links on the conveyor. The conveyor was turned over three times during the inspection that night. The job took all night, he leaving the mine at five in the morning. He added that an inspection was made of the conveyor every night, that usually a repair of one kind or another was necessary and described the repairing as a "gradual" process.

Examination of the workings during the night shift preceding the explosion showed no presence of gas, testified the firebosses. Mr. Bryson testified that twice since Nov. 1, 1928, the sprinkling system had been out of order, but he believed it was in operation on the morning of March 21. Mr. Taylor admitted that when the sprinkling system broke down, dumping of coal continued nevertheless, the repair of the system usually not taking much time. He added that the last break was due to freezing of water in the feed lines.

Tracked entries were thoroughly rock-dusted, stated Mr. Taylor. Mr. Jobes testified that the last rock-dusting was done on the Friday preceding the explosion. Both haulage and return entries were rock-dusted in his section of the mine, said Edward L. Haas, assistant mine foreman. Mr. McGregor stated that a number of rock-dust barriers had been installed. When he made his last inspection of the mine, William Eash, safety engineer, who was killed in the explosion, told him that dust samples last taken showed 76 per cent incombustible material.

Retailers and Wholesalers Meet N.C.A. Committee

The National Coal Association sees promise in the results of its initial co-operative contact with the National Retail Coal Merchants' Association and the American Wholesale Coal Association. A meeting with a committee of the retailers was held on March 15 and with the wholesalers on the following day, both in Washington. At both meetings it was urged that shipment on open consignment be eliminated. Consideration was given at the retailers' meeting to questions of discounts, development of mechanical firing apparatus, advertising and of defining the natural sales division as between wholesaler and retailer. It was agreed that the demand for unusual sizes of coal is increasing and that in consequence the necessity for standardization of sizes is growing more urgent. Appointment of a committee of four, two from the N.C.A. and two from the retailers association, was recommended for the study of standardization.

At the committee meeting with the wholesalers opinion was expressed that there would be fewer rejections of coal shipments if the buyers knew that the sellers made it an invariable rule to investigate the justification of all rejections. Non-enforcement of terms of payment contracts is bringing about a situation where it is possible to enforce the terms only through discount allowances. To avoid this the conference recommended that specifications of the terms of the sale be placed on the invoice or contract and that these be enforced. The conference declared the practice of an operator directly soliciting the bona fide customers of the wholesaler to be unfair. It believes in the wholesalers having contractual relations with the mines they represent and that they should give direct billing on all coal from those mines.

Fairmont Mines in Drive For More Business

Northern West Virginia coal operators met at Fairmont late in the second week in April and appointed three committees to devise ways and means to create a larger tidewater and export coal market for mines of the district. The committees will make an intensive study of rates, marketing and production costs. The rate committee will consider all matters relating to transportation charges, particularly in regard to differentials affecting the field, with a view to bringing about adjustments that will benefit the field in its entirety.

Mines Resuming Operation

Mines of the Consolidation Coal Co. at McRoberts and Jenkins, in the Elkhorn field of eastern Kentucky, are now operating full time. Other plants in the same district which are now in full-swing operation are the Seco mine of the Consolidated Fuel Co., now held by the new Amalgamated Coal Corporation; the Millstone mine of the South East Coal Co. and those of the Elkhorn Coal Corporation. Mines of the Old Dominion Anthracite Coal Co., near Pulaski, Va., have resumed operation after a shutdown of three weeks. Production of coal was resumed on April 15 at the Glendale mine of the Glendale Coal Co., near Moundsville, W. Va. The Panama mine of the Ben Franklin Coal Co., in the same field, resumed full-time operation the middle of April. Other mines in the Panhandle district of northern West Virginia are preparing to reopen, having gotten a share of the lake business.

Mine Inspectors' Institute To Meet in Knoxville

The Mine Inspectors' Institute of America will hold its twentieth annual convention at Knoxville, Tenn., in the Whittle Springs Hotel, May 7, 8 and 9. Following is the program of the meetings: "Electricity Hazards in and About Coal Mines," by H. P. Musser, Charleston, W. Va.; "Ventilation of Gaseous Mines in Low Seams of Western Pennsylvania," by C. H. Crocker, Johnstown, Pa.; "Basic Analysis of Coal-Mine Accidents," by R. E. Simpson, Hartford, Conn.; "Utilize Electricity to End Uncertainties of Sectional Ventilation," by J. H. Edwards, Associate editor, *Coal Age;* "Mine Safety," by R. E. Howe, Knoxville, Tenn.; "Responsibility of Heads of State Departments," by James Sherwood, Pittsburg, Kan. The institute will make a trip to the Smoky Mountain National Park and will hold its banquet at the Cherokee Country Club.

King Coal's Calendar for April

April 1—Jones bill repealing anthracite tonnage tax passes Pennsylvania House of Representatives by vote of 160 to 16 and is sent to Senate for action.

April 3—Interstate Commerce Commission refuses to suspend tariffs filed by the Pittsburgh & Lake Erie and Pennsylvania railroads from the Pittsburgh district to Eastern destinations. About 140 mines in the Pittsburgh group are placed in the Westmoreland group for rate-making purposes, eastbound, resulting in a 15c. reduction.

April 6—Interstate Commerce Commission refuses to suspend tariffs filed by Northern carriers reducing rates on lake cargo coal 5c. from the Fairmont and central Pennsylvania districts and 2c. from the Connellsville district, effective April 8.

April 7—Syndicate headed by W. H. Cloverdale, president, Gulf States Steel Corporation, and W. W. Colpitts, consulting engineer, New York City, buys Tennessee, Alabama & Georgia R. R. The road traverses the Lookout Mountain coal field between Gadsden, Ala., and Chattanooga, Tenn.

April 10—Louisville & Nashville Ry. granted certificate of public convenience by I. C. C. to construct 7-mile extension of Left Fork branch in Bell County, Kentucky, to open up coal and timber lands.

April 10—Reorganization of operating department of Lehigh Valley Coal Corporation, involving numerous changes, is announced by Frank H. Wagner, general manager.

April 11—About 100 representatives of coal trade and of companies identified with heating appliances and allied lines take definite steps to form Anthracite Club of New York. Purposes of the organization are announced and officers elected.

April 12—Conditional approval of Louisville & Nashville R. R.'s plan to take over under lease the property of the Louisville, Henderson & St. Louis line is granted by Interstate Commerce Commission.

April 12—Frank Wagner, general manager, Lehigh Valley Coal Corp., announces at Wilkes-Barre, Pa., that several idle colleries will resume operations within a week.

April 16—Wage reductions ranging from 1.7 to 7 per cent announced by Pittsburgh Coal Co. and Carnegie Coal Co.

April 17—The Heaton bill, providing for gradual removal of the anthracite tonnage tax passes House at Harrisburg, Pa., by vote of 168 to 10 and goes to Governor Fisher for consideration.

April 20—Application of Virginian Ry. to Interstate Commerce Commission for permission to construct one mile of track and a bridge across the Kanawha River at Deep Water, W. Va., opens new phase of struggle between Norfolk & Western and New York Central for control of the Virginian. The proposed improvement would link the Virginian with the Kanawha & Michigan, a subsidiary of the New York Central.

April 20—Governor Fisher of Pennsylvania signs Mansfield bill to curb evils of coal and iron police and also approves measure to establish barrier pillars when mine workings approach property line.

April 22—Western Pennsylvania Coal Traffic Bureau files petition with Interstate Commerce Commission asking reopening of the lake cargo coal rate case. The complaint asked that rates of $1.91 per ton be fixed on shipments of high-volatile coal from Southern mines and $2.06 on Southern low-volatile coal in lake cargo traffic.

April 23—Failure to adjust grievances growing out of the discharge of two miners, it was alleged, caused 1,800 mine workers employed at the Eddy Creek colliery of the Hudson Coal Co., at Olyphant, Pa., to go on strike.

April 26—American financial and industrial leaders form alliance with German combine to organize American company which will manufacture and market gasoline extracted from coal. A wide variety of other products, such as chemicals, pharmaceutical articles, fertilizers and photographic articles are to be produced.

April 27—Consolidation Coal Co. reiterates labor and operating policy and attacks producers who "cut miners' wages below a sound economic level."

Coal Mine Fatalities During March Higher Than Year Ago

ACCIDENTS at coal mines in the United States in March, 1929, caused the death of 178 men, according to information furnished by state mine inspectors to the U. S. Bureau of Mines. Twenty-nine of these accident fatalities were in the anthracite mines of Pennsylvania; the remaining 149 were in bituminous coal mines in various states.

The death rate per million tons of coal produced during the month was 4.01, based on a production of 44,391,000 tons, as compared with 3.07 for March, 1928, based on an output of 49,452,000 tons and 152 fatalities. The rate for bituminous coal alone for March, 1929, was 3.79 with a production of 39,347,000 tons and that for anthracite was 5.75, with a tonnage of 5,044,000, as compared with rates of 2.59 and 6.91, respectively, for March last year.

Reports for the first three months of 1929 show 530 fatalities in coal mines. Of this number 419 were at bituminous mines and 111 at anthracite mines. For this period 157,125,000 tons of coal was produced, of which 138,074,000 tons was bituminous and 19,051,000 was anthracite. The per-million-ton death rate for the industry as a whole was 3.77; for bituminous 3.03, and for anthracite 5.83. Compared with February of the present year there was a slight increase in the death rate both for bituminous mines and for the total bituminous and anthracite, but a slight decrease was shown for anthracite alone.

One major disaster—that is a disaster in which five or more lives was lost—occurred during the month of March, 1929. This was an explosion at Parnassus, Pa., on March 21, which caused the death of 46 men. March of 1928 was free from such disasters. The first three months of 1929 showed two major disasters with a total of 60 deaths as compared with three disasters and 46 deaths during the first quarter of 1928. Based exclusively on these disasters the death rate per million tons of coal mined in 1929 was 0.382 as compared with 0.314 for the first three months of 1928.

Comparing the accident record for the period January to March, 1929, with the same period of 1928, a reduction is noted in the death rate for falls of roof and coal and electricity, but increases are shown for haulage, gas or dust explosions and explosives.

The comparative rates for the three-month periods of 1929 and 1928 are as follows:

	Year 1928	Jan.-Mch., 1928	Jan.-Mch., 1929
All causes	3.812	3.322	3.373
Falls of roof and coal	1.868	1.784	1.693
Haulage	0.632	0.513	0.668
Gas or dust explosions:			
Local explosions	0.088	0.082	0.102
Major explosions	0.572	0.314	0.375
Explosives	0.130	0.144	0.153
Electricity	0.155	0.130	0.076
Other causes	0.367	0.355	0.306

200,000 More Employed Than Year Ago

There were 200,000 more workers employed in the United States in mid-April than were on the payrolls a year ago, according to an estimate by James J. Davis, Secretary of Labor. The calculation is based on Labor Department figures and upon a special canvass undertaken in Baltimore, Md., as a representative point.

Only the building industry, he declared, was failing to show much advance in employment. One of the reasons for that, he said, was "high interest rates, which have temporarily halted borrowing by municipalities and others to finance construction."

Kentucky Operators at Odds

The organization of the western Kentucky coal operators has been abandoned. Co-operation was destroyed when differences of opinion arose as to open and closed market territory. There is growing talk of a wage revision in the field as a means of combating competitive conditions from Illinois and Indiana. Thus far, however, no definite action has been taken by any of the representative companies. Leading operators oppose a wage reduction on the theory that it threatens ultimate unionization of the field, which is now working under the 1917 scale of wages.

Coal-Mine Fatalities During March, 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	3	....	2	....	....	....	....	....	....	....	....	5	....	....	....	....	....	....	....	....	....	....	....	....	5	6
Alaska	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Arkansas	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	2
Colorado	4	2	1	....	....	....	....	....	....	....	....	7	....	....	....	....	....	....	....	....	....	....	....	....	7	16
Illinois	3	....	....	....	....	....	....	....	....	....	....	3	....	....	....	....	....	....	....	....	....	1	....	1	4	1
Indiana	1	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	1	....	....	....	....	....	....	....	2	4
Iowa	1	....	1	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	0
Kansas	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	8
Kentucky	7	....	2	....	....	....	1	....	....	....	....	10	....	....	....	....	....	....	....	....	....	....	....	....	10	0
Maryland	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Michigan	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Missouri	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	1
Montana	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
New Mexico	....	....	1	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1	2
North Dakota	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	0
Ohio	4	....	1	....	....	....	....	....	....	....	....	5	....	....	....	....	....	....	....	....	....	....	....	....	5	2
Oklahoma	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	1
Pennsylvania (bituminous)	17	....	4	46	2	....	1	....	....	....	....	70	....	....	....	....	....	....	....	....	....	....	1	1	71	27
Tennessee	2	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	3
Texas	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	1
Utah	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	1
Virginia	4	....	....	....	....	....	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	....	....	4	3
Washington	2	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	0
West Virginia	14	6	7	1	....	....	....	....	....	....	....	28	....	....	....	....	....	....	1	1	....	....	....	2	30	35
Wyoming	2	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2	1
Total (bituminous)	66	8	19	47	2	....	2	....	....	....	....	144	....	....	1	....	1	....	1	1	....	1	1	4	149	114
Pennsylvania (anthracite)	12	3	6	1	1	....	....	....	....	....	3	26	3	....	....	....	3	....	....	....	....	....	....	....	29	38
Total, March, 1929	78	11	25	48	3	....	2	....	....	....	3	170	3	....	1	....	4	....	1	1	....	1	1	4	178	....
Total, March, 1928	83	5	24	5	11	3	10	1	3	....	2	147	....	....	1	....	1	....	....	2	....	2	....	4	....	152

Among the Manufacturers

THE COAL-MINING MACHINERY DEVELOPMENTS of the Bethlehem Steel Co., including the Bethlehem coal-loading machine, have been acquired by J. F. Joy, who has resigned his position as chief engineer of mining machinery with Bethlehem to head a new company being organized, with temporary offices at 260 West Jersey St., Elizabeth, N. J., to take up the manufacture and sale of this new line of equipment. The products of the new company will include caterpillar-mounted coal-loading machines, caterpillar-mounted universal cutting and shearing machines and a new form of machine called "Coal Hustlers." The purpose of the latter machine is to so dispose of the coal back of loading machines as to permit of continuous and uninterrupted loading operations, thereby overcoming the delays incidental to car changing.

* * *

CHARLES STROM, formerly with the Fiske Tire & Rubber Co., has joined the export sales department of the Black & Decker Mfg. Co. and, after a short stay at the factory in Towson, Md., will represent this company in foreign markets.

THE SULLIVAN MACHINERY CO. has moved its general offices from the Peoples Gas Building, Chicago, to new quarters in the Wrigley Building, 400 North Michigan Ave., Chicago.

* * *

THE COAL MINE EQUIPMENT SALES CO. has removed its office to the Beasley Building, Terre Haute, Ind.

* * *

A SALES OFFICE has been established in Cleveland, Ohio, by the Manganese Steel Forge Co., Philadelphia, Pa. The new office which is located at 623 Union Trust Building, is in charge of P. M. Hobbs, who has been connected with the sales departments of the company's main office and of the Chicago office.

* * *

ROBBINS & MEYERS, INC., Springfield, Ohio, has organized a crane and hoist division, of which Frank F. Seaman has been made general manager; Carl E. Schirmer, chief engineer, John R. Mears, sales manager; Albert Kreh, district sales manager for New York; William J. Scott, district manager for Chicago, and John J. Becker, in charge of the Detroit district.

THE JOHNS-MANVILLE CORPORATION has announced the acquisition of the United States and Canadian rights to manufacture and sell transite pipe, a seamless pipe made of asbestos and cement, under the patents of the Eternit Pietra Artificiale, Societe Anonima, of Genoa, Italy.

* * *

THE ROLLER-SMITH CO., 233 Broadway, New York City, has made these appointments: Carl P. Lohr, 401 National Bank of Commerce Building, St. Louis, Mo., as district sales agent for the St. Louis territory; Jackson Brown, Jr., 701 Kittridge Building, Denver, Colo., as district sales agent for Colorado, Utah, Wyoming and New Mexico; J. C. McDougall, Alaska Building, Seattle, Wash., as district sales agent for Washington, Oregon and Alaska.

* * *

EFFECTIVE APRIL 5, the address of the sales, executive and accounting offices of the Waverly Oil Works Co. is 2050 Koppers Building, Pittsburgh, Pa.

* * *

PENDLETON-GILKEY CO., Minneapolis, Minn., whose plant is located at Spokane, Wash., has been appointed by the Curtin-Howe Corporation as a licensee to treat forest products of all kinds with the ZMA process.

* * *

THE WORTHINGTON PUMP & MACHINERY CORPORATION has transferred W. J. Denholm from the Chicago office to the post of assistant to the manager of the Harrison works, Harrison, N. J.

* * *

THE AMERICAN HOIST & DERRICK CO., 63 South Robert St., St. Paul, Minn., has appointed A. R. Gelinas as its agent for Ontario, Quebec, and the Maritime Provinces. His office is located in the McRitchie & Black Building, 1434 St. Catherine St. West, Montreal, Quebec, Canada.

* * *

THE CENTRAL ALLOY STEEL CORPORATION has appointed S. H. Truitt as district sales manager of the Philadelphia district. He will succeed C. C. Willits, resigned. Mr. Truitt formerly was assistant sales manager at Philadelphia and has been connected with the company for some years.

* * *

THE NAME of the American Spiral Pipe Works, Chicago, has been changed to the Taylor Forge & Pipe Works.

Trade Literature

Diamond Drills and Supplies. Sprague & Henwood, Inc., Scranton, Pa. Circular No. 28-A; 14 pp., illustrated.

Protect Your Plant and Equipment is the title of a booklet issued by the Quigley Furnace Specialties Co., Inc., New York City, describing its solutions to prevent corrosion; 23 pp., illustrated.

American Wurtzilite Co., Chicago, has issued a 7-pp. folder describing its Paints, Coatings and Binders for Protective and Industrial Uses.

The following bulletins were recently issued by the General Electric Co., Schenectady, N. Y.: Helicoil (Sheath Wire) Resistor Units for Cable-reel Motors, GEA-961A; Adjustable-Varying-Speed Motors, Type BSR, GEA-98A; Insulating Material for Railway and Industrial-Haulage Apparatus, GEA-991.

Motor Maintenance Specialties. Martindale Electric Co., Cleveland, Ohio. Catalog No. 12; 33 pp., illustrated. Among some of the equipment listed are armature repair tools, sprayers, blowers, circuit tester, automatic circuit breakers.

Copper-Bearing Steel Pipe. National Tube Co., Pittsburgh, Pa. Bulletin No. 11; 10 pp., illustrated.

Arktite Circuit-Breaking Plugs and Receptacles. Crouse-Hinds Co., Syracuse, N. Y. Bulletin 2121; 36 pp., illustrated. Describes the simplicity of construction, grounding, extension cable connectors, identification of terminals, plugs, etc. Price lists are included.

Wagner Electric Corporation, St. Louis, Mo., has issued Bulletin No. 162, 8 pp., on its Transformer Oil. It contains specifications and discusses the purposes of transformer oil, its properties, methods of testing, precautions when handling and storing.

Looking Ahead Twenty Years in Wood Utility is the title of a 37-p. illustrated booklet issued by the Grasselli Chemical Co., Cleveland, Ohio, stressing the advantages of standard methods of wood preservation for new uses of treated wood. Information is given on wood preservation in the United States; specifications and costs data also are included.

Sullivan Angle Compound Air Compressors Direct-Connected to Diesel Engines. Sullivan Machinery Co., Chicago. Bulletin No. 83-L; 19 pp., illustrated. Sizes of stock units are given, and Sullivan four-cylinder "V" type single-acting compressors are shown direct-connected to oil engines.

Where Should the Cause Be Sought When the Percentage of Lump Coal Decreases? by George S. Brown, of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

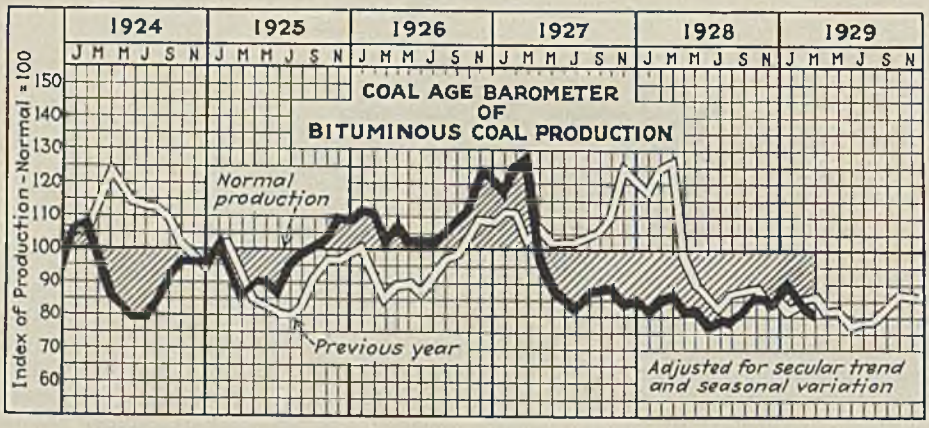
Pulverized Coal for Metallurgical Work, by W. O. Renkin, issued by the Combustion Engineering Corporation, New York City, and reprinted from Blast Furnace and Steel Plant, is a general review of the prevailing practice in the burning of powdered coal in steel-plant furnaces. Four-page folder, illustrated.

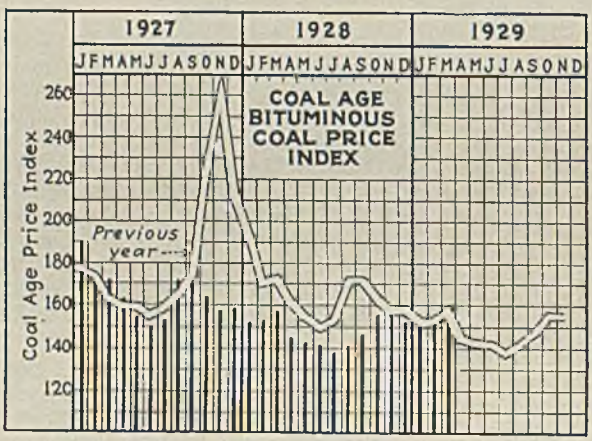
The following bulletins have been issued by the General Electric Co., Schenectady, N. Y.: Centrifugal Compressors, Geared Units, GEA-583B; CR 7006-F1 Magnetic Switch—Across-the-line Starter for Induction Motors with Motor-Circuit Switch and Fuses, GEA-1106; Totally Inclosed, Fan-Cooled D.C. Motors, Type CD, GEA-517B. These are 4-p. folders, illustrated.

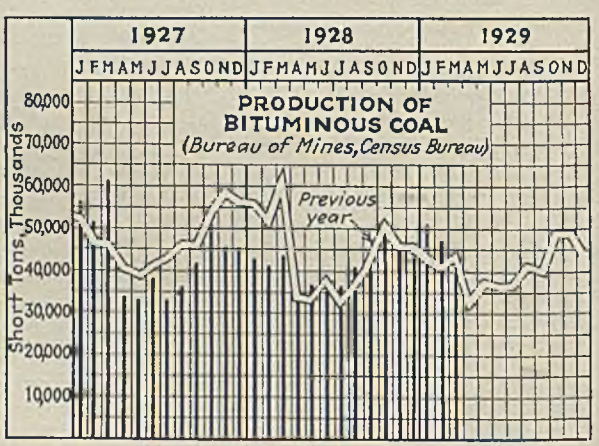
Link-Belt Co., Chicago, has issued Bulletin No. 1167, of 38 pp., showing detailed specifications of its 15,000 sprocket wheels.

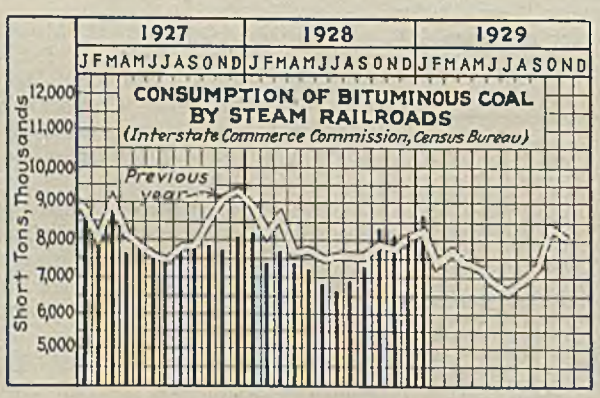
Power Factor Correction. Esterline-Angus Co., Indianapolis, Ind. Bulletin No. 329; 4-pp. folder, illustrated.

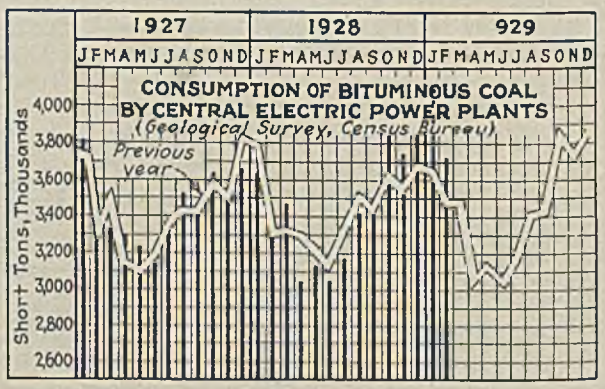
Indicators of Activities in the Coal Industry

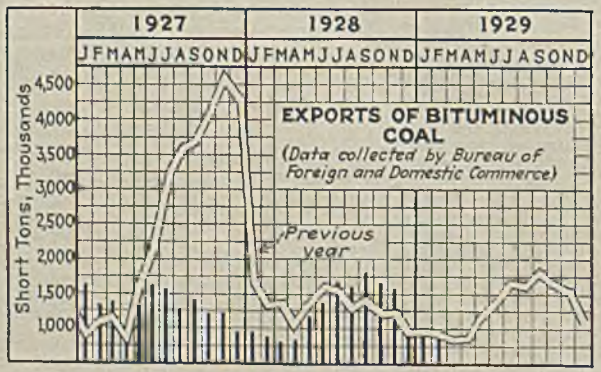


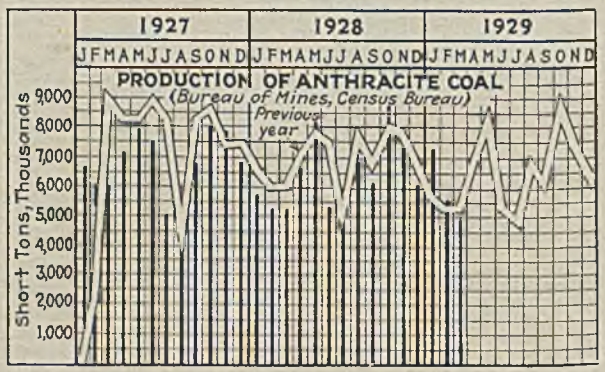












MARKETS *in Review*

MARKET conditions in the bituminous coal trade of the United States were conspicuously dull throughout April, and this despite spring price adjustments—mostly downward. The price recessions, which were on the higher priced prepared coals used for heating purposes, sent the average quotation tumbling to the lowest level reached in years. The tonnage represented in contracts thus far closed has been disappointingly small, retailers as well as industrial consumers being loath to renounce their bargain-hunting ventures in the open market.

Curtailment of production here and there—voluntarily in the case of some producers to meet prevailing conditions and by reason of floods in the mines in others—probably has done much to avert an even less promising situation. Even so, output for this year up to April 13 was over 11,500,000 net tons in excess of that for the corresponding period of last year. The stabilizing influence of the lake trade has not made itself felt thus far, as shipments are only just getting under full headway. Reports of general industrial conditions in the large centers are distinctly favorable.

Coal Age Index (preliminary) of spot bituminous prices in April was 139½, compared with the revised March figure of 148. By weeks the figures for April were 140, April 6 and 13, and 139, April 20 and 27. The corresponding weighted average prices were $1.70, $1.69, $1.68 and $1.68. Revised figures for March were 153, March 2; 152, March 9; 151, March 16; 144, March 23, and 140, March 30. The corresponding weighted average prices were $1.85, $1.84, $1.82, $1.75 and $1.70.

During the first half of the month a listless tone prevailed in the anthracite trade as far as domestic sizes were concerned. In the last fortnight there was a slight revival of interest by retailers desirous of anticipating the 10c. advance in price effective May 1. Nut was somewhat in the lead in demand, followed by stove. Egg was a little stronger; pea, however, was largely neglected. The steam sizes were notably firm, due in large degree to the reduced output of the larger sizes. A large number of collieries were idle during the first ten days of the month.

Business came to practically a complete standstill in April in the Chicago market pending the arrival of the fill-up season and of full headway of shipments to the lower lake ports. The effect of the collapse in demand is reflected in a pronounced drop in production in Illinois fields. Domestic demand was very flat, especially for coals from Indiana and western Kentucky. Smokeless also was lagging, though its position has been improved somewhat by lighter shipments from the mines. Retailers have been buying sparingly and consumers' stocks have been allowed to run low in anticipation of price revisions for May.

IN SPITE of a marked scarcity of screenings at Midwest mines there has been no difficulty in keeping pace with the desultory demand, and the same holds true of the other steam grades. Contracting on steam coals from the Illinois, Indiana and western Kentucky fields has been extremely disappointing to all producers except those in southern Illinois. The latter have regained a considerable amount of the tonnage lost to non-union fields during the labor difficulties in Illinois.

The price of smokeless lump was fairly firm at $2.75@$3, with mine-run rather slow at $1.85@$2.25. Western Kentucky operators offered 6-in. and 3-in. lump and 6x3-in. egg as low as $1.15. Quotations on Illinois coals generally were steadied by the curtailment of output. The deferred-payment plan proposed by the anthracite producers has fallen through in Chicago.

Reports from the Illinois mining fields showed that practically all mines in the Belleville and Mt. Olive fields were operating only two days a week and with the outlook none too promising. Wet, chilly weather in the St. Louis area kept a small tonnage of domestic sizes moving, mostly from yards. Steam-coal requirements were largely taken care of from storage piles; in fact, little coal of any sort moved from the mines. Natural gas from the southern Arkansas field is promised within twelve months.

THERE was a distinct falling off in the movement of coal from the Duluth and Superior docks during April. Shipments for the month are estimated at about 14,000 cars as against 15,562 during March and the record loading of 31,290 cars in February. Consumers showed a disposition to limit purchases to current requirements pending the announcement of prices on May 1. The new prices show recessions of 25c.@50c. on prepared sizes of smokeless, with mine-run unchanged and screenings up 10c. Prepared sizes from Kentucky are off 25c.@50c. and screenings up 10c.; splint is cut 45c.@65c. for prepared with screenings up 10c.; Youghiogheny prepared down 25c.@80c.; screenings, up 10c.; Hocking prepared, off 90c., and screenings, up 5c. Advances of 15c.

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

		Week Ended							
		April 6, 1929		April 13, 1929		April 20, 1929		April 27, 1929	
	Market Quoted	Independent	Company	Independent	Company	Independent	Company	Independent	Company
Broken	New York	.....	$7.90@$8.00	.....	$7.90@$8.00	.....	$7.90@$8.00	.....	$7.90@$8.00
Broken	Philadelphia	$7.90@$8.00	7.90	$7.90@$8.00	7.90	$7.90@$8.00	7.90	$7.90@$8.00	7.90
Egg	New York	7.90@ 8.15	8.15	7.25@ 8.15	8.15	7.95@ 8.15	8.15	7.95@ 8.15	8.15
Egg	Philadelphia	8.15@ 8.40	8.15	8.15@ 8.40	8.15	8.15@ 8.40	8.15	8.15@ 8.40	8.15
Egg	Chicago*	7.27	7.27	7.27	7.27	7.27	7.27	7.27	7.27
Stove	New York	8.40@ 8.65	8.65	8.25@ 8.65	8.65	8.40@ 8.65	8.65	8.40@ 8.65	8.65
Stove	Philadelphia	8.65@ 8.90	8.65	8.65@ 8.90	8.65	8.65@ 8.90	8.65	8.65@ 8.90	8.65
Stove	Chicago*	7.72	7.72	7.72	7.72	7.72	7.72	7.72	7.72
Chestnut	New York	7.90@ 8.15	8.15	7.25@ 8.15	8.15	7.95@ 8.15	8.15	7.95@ 8.15	8.15
Chestnut	Philadelphia	8.15@ 8.40	8.15	8.15@ 8.40	8.15	8.15@ 8.40	8.15	8.15@ 8.40	8.15
Chestnut	Chicago*	7.27	7.27	7.27	7.27	7.27	7.27	7.27	7.27
Pea	New York	4.15@ 4.40	4.40	4.05@ 4.40	4.40	4.15@ 4.40	4.40	4.15@ 4.40	4.40
Pea	Philadelphia	4.40@ 4.65	4.40	4.40@ 4.65	4.40	4.40@ 4.65	4.40	4.40@ 4.65	4.40
Pea	Chicago*	3.92	3.92	3.92	3.92	3.92	3.92	3.92	3.92
Buckwheat	New York	2.60@ 2.75	†2.75	2.50@ 2.75	†2.75	2.60@ 2.75	†2.75	2.60@ 2.75	†2.75
Buckwheat	Philadelphia	2.75@ 3.00	2.75	2.75@ 3.00	2.75	2.75@ 3.00	2.75	2.75@ 3.00	2.75
Rice	New York	1.85@ 2.00	2.00	1.75@ 2.00	2.00	1.85@ 2.00	2.00	1.85@ 2.00	2.00
Rice	Philadelphia	2.00@ 2.25	2.00	2.00@ 2.25	2.00	2.00@ 2.25	2.00	2.00@ 2.25	2.00
Barley	New York	1.35@ 1.50	1.50	1.35@ 1.50	1.50	1.35@ 1.50	1.50	1.35@ 1.50	1.50
Barley	Philadelphia	1.50@ 1.60	1.50	1.50@ 1.60	1.50	1.50@ 1.60	1.50	1.50@ 1.60	1.50

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

will be made on June 1, July 1 and Aug. 1 and 5c. Sept. 1.

Coal stocks on the docks at Duluth, Superior, Washburn and Ashland had fallen to 2,688,887 tons of bituminous and 314,223 tons of anthracite on April 1, or nearly 400,000 and 133,000 tons, respectively, less than the year before, and it is likely that the total will have shrunk to 2,500,000 by May 1. The first cargo of coal arrived by lake at Superior on April 15, or sixteen days earlier than the first arrival of last year. It is expected that shipments from the lower lake ports this season will comprise about 10,000,000 tons of bituminous and 550,000 tons of anthracite. Prices remain unchanged and firm.

A SUDDEN break in the severe weather in Colorado early in April caused a severe slump in the demand for domestic coal, which tended to unsettle the entire market. Cancellations have piled up and "no bills" have mounted, particularly on the large sizes. Demand for steam grades, on the other hand, has been very good, with an advance of approximately 40c. per ton in prices. Operating time at the mines has been reduced about 12 per cent. April mine quotations were: Walsenburg-Canon City lump, $4.25; nut, $4; washed chestnut, $3.25; Trinidad coking lump, nut and chestnut, $2.75; Crested Butte bituminous lump, $4.25; nut, $4; Crested Butte anthracite furnace and egg, $8.50; Rock Springs-Kemmerer lump, $4; nut, $3.75; steam coal, $1.50; Colorado steam coals, $1.40.

Kansas shovel lump and nut coal found a seasonally slow outlet during April at $2.50 a ton with deep-shaft lump, $3.50, the lowest list price in years, although some sales were reported below these figures last summer. These prices are 50c. to $1.50 lower than in April of last year. Crushed mine-run, which comprises a large part of the current steam supply, is selling at $2.25 a ton.

Storage prices for Southwestern coals announced in April follow: McAlester (Okla.) lump, $5.50; Wilburton (Okla.) lump, $4.75; Henryetta (Okla.) lump, $3.25 to $3.50. Storage prices taking effect May 1 are: Paris (Ark.) lump, $4.75; Spadra (Ark.) anthracite, grate, furnace, egg and range, $5.25; No. 4, $5.75; nut, $4.75; Bernice (Ark.) grate and nut, $6.05; egg, $6.30; No. 4, $7.30.

With the Louisville trade as well as the Kentucky producers April has been a rather unsatisfactory month. Demand for screenings it is true, has been active and at good prices, but this was due to a scarcity caused by a dearth of orders for prepared sizes. Lake business has been slow in coming. Fair business was reported in contracts from railroads and industrial consumers. Working time, however, has been very low in both the eastern and western mining regions of the state. Floods in the southeastern section, which caused a complete shutdown of some mines early in the month, were not utterly lacking in advantages, considering the limited demand.

PRICES advanced materially on steam coals, but there were recessions in all other grades. Screenings were selling in eastern Kentucky late in the month at $1@$1.50; mine-run, $1.25@$1.60; lump and egg, $1.50@$1.75; block, $1.75@$2. Western Kentucky quotations were: Screenings, $1.10@$1.35; mine-run, $1.10@$1.40; lump and egg, $1.20@$1.40; block, $1.30@$1.50. The fact that Indiana and Illinois mines have been holding screenings for strong prices has aided western Kentucky product.

April, usually the month of contracts with the Cincinnati trade, saw consumers playing hide and seek this year. The smokeless factors seemed just a little more put out about it than the vendors of high-volatile coals. Both takers of contract tonnage and spot buyers were inclined to wait until May before signing up, seeming to think that through inactivity they could force a lower market. Smokeless producers, however, curtailed working time to hold down tonnage. In fact production south of the Ohio River and in territory that markets through Cincinnati has been more constricted than for many a day. Tonnage passing through the gateway here since the first of the month has hovered around 7,000 cars per week, or from 1,000 to 3,000 cars below the normal for the last five years.

This gives an index to the volume of current spot buying. True, inquiries were in good volume and of promise, but these prospects held no certainty of immediate realization, and the market kept feeling around for a way out. A large number of mines in southeastern Kentucky and West Virginia closed down rather than run the risk of consigning coal. Some of those that kept on producing found it necessary to apply good lump and block on mine-run orders in order to move it. About the only grade that was benefited by this situation was screenings, which in the second week of the month rose in price to $1@$1.25, with ordinary grades selling at the top. Hasty buying orders were responsible for this, and after the first rush the price settled back to an average between the two. Otherwise all other lines were listless. In a retail way there has been no change from the set figures of April 1, which were: smokeless lump, $7@$7.50; mine-run, $5.75@$6; bituminous lump, $5.50; slack, $4@$4.25.

THE Columbus market during April marked time awaiting developments in the lake trade. Contracting was slower than ever before, as many of the larger consumers were willing to sign up for only a small portion of their requirements, intending to obtain the remainder on the open market. Railroad contracts are not yet at the closing point, although some negotiations have taken place, and a majority of the utilities' agreements are still hanging fire. Contract prices are slightly lower than last year.

The domestic trade was rather slow and retailers showed no disposition to replenish yard supplies. Indications also point to a later stocking season than usual on the part of householders. The prospects for the southern Ohio field sharing to an important extent in lake business do not seem as bright as several weeks ago, though producers in the Hocking Valley are still hopeful of taking a prominent place in the picture when the season gets well under way.

In the Pittsburgh district there was the usual April decline in production.

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

LOW-VOLATILE, EASTERN	Market Quoted	April 6, 1929	April 13, 1929	April 20, 1929	April 27, 1929
Smokeless lump	Columbus	$2.75@$3.00	$2.50@$2.75	$2.50@$2.75	$2.50@$2.75
Smokeless mine-run	Columbus	1.75@ 2.00	1.75@ 1.95	1.75@ 1.95	1.75@ 1.95
Smokeless screenings	Columbus	1.10@ 1.35	1.10@ 1.35	1.10@ 1.35	1.10@ 1.35
Smokeless lump	Chicago	2.50@ 3.00	2.50@ 3.00	2.50@ 3.00	2.75@ 3.00
Smokeless mine-run	Chicago	1.75@ 2.25	2.75@ 2.25	1.85@ 2.25	1.85@ 2.25
Smokeless lump	Cincinnati	2.50@ 2.75	2.75@ 3.00	2.50@ 2.75	2.50@ 2.75
Smokeless mine-run	Cincinnati	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Smokeless screenings	Cincinnati	1.15@ 1.50	1.10@ 1.35	1.10@ 1.25	1.10@ 1.25
*Smokeless mine-run	Boston	4.15@ 4.25	4.10@ 4.20	4.00@ 4.20	4.00@ 4.20
Clearfield mine-run	Boston	1.55@ 1.80	1.55@ 1.80	1.50@ 1.75	1.50@ 1.75
Cambria mine-run	Boston	1.75@ 2.10	1.75@ 2.10	1.75@ 2.00	1.75@ 2.00
Somerset mine-run	Boston	1.65@ 2.00	1.65@ 2.00	1.60@ 2.00	1.60@ 2.00
Pool 1 (Navy Standard)	New York	2.20@ 2.55	2.20@ 2.55	2.20@ 2.55	2.20@ 2.55
Pool 1 (Navy Standard)	Philadelphia	2.20@ 2.50	2.20@ 2.50	2.20@ 2.50	2.20@ 2.50
Pool 9 (super. low vol.)	New York	1.70@ 1.95	1.70@ 1.95	1.75@ 2.00	1.75@ 2.00
Pool 9 (super. low vol.)	Philadelphia	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Pool 10 (h. gr. low vol.)	New York	1.45@ 1.60	1.45@ 1.60	1.50@ 1.65	1.50@ 1.65
Pool 10 (h. gr. low vol.)	Philadelphia	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75
Pool 11 (low vol.)	New York	1.35@ 1.50	1.35@ 1.50	1.40@ 1.55	1.40@ 1.55
Pool 11 (low vol.)	Philadelphia	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60
HIGH-VOLATILE, EASTERN					
Pool 54-64 (gas and st.)	New York	$1.25@$1.40	$1.25@$1.40	$1.25@$1.40	$1.25@$1.40
Pool 54-64 (gas and st.)	Philadelphia	1.25@ 1.40	1.25@ 1.40	1.25@ 1.40	1.25@ 1.40
Pittsburgh sc'd gas	Pittsburgh	1.90@ 2.10	1.90@ 2.00	1.80@ 2.00	1.80@ 2.00
Pittsburgh gas mine-run	Pittsburgh	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75
Pittsburgh mine-run	Pittsburgh	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75
Pittsburgh slack	Pittsburgh	1.00@ 1.20	1.00@ 1.10	1.00@ 1.10	1.00@ 1.10
Kanawha lump	Columbus	1.65@ 2.00	1.65@ 2.00	1.60@ 1.95	1.60@ 1.95
Kanawha mine-run	Columbus	1.25@ 1.50	1.25@ 1.45	1.25@ 1.45	1.25@ 1.45
Kanawha screenings	Columbus	1.00@ 1.15	1.00@ 1.20	1.00@ 1.20	1.10@ 1.25
W. Va. lump	Cincinnati	1.65@ 2.00	1.75@ 2.00	1.65@ 2.00	1.65@ 2.00
W. Va. gas mine-run	Cincinnati	1.35@ 1.65	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50
W. Va. steam mine-run	Cincinnati	1.15@ 1.40	1.00@ 1.35	1.00@ 1.35	1.00@ 1.35
W. Va. screenings	Cincinnati	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25	1.00@ 1.25
Hocking lump	Columbus	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Hocking mine-run	Columbus	1.25@ 1.55	1.25@ 1.55	1.25@ 1.50	1.25@ 1.50
Hocking screenings	Columbus	1.10@ 1.25	1.10@ 1.25	1.10@ 1.30	1.10@ 1.30

* Grosstons, f.o.b. vessel, Hampton Roads.

While a number of industrial contracts were signed the prices generally were unsatisfactory; one contract for 800,000 tons of three-quarter gas coal was reported made at $1.80. The volume of lake business also was a disapointment. The weakening in prices was responsible for a cut in wages by the Pittsburgh Coal Co. and the Carnegie Coal Co. The decline in the price of gas coal lump was the most serious of price changes; slack coals continued strong during the early part of the month, but showed an easing tendency toward the end.

A blow to the Connellsville coke district was the leasing of the Leetonia and Sharpsville furnaces by the Davison interests, of Pittsburgh. These plants will be furnished with by-product coke from the new Davison development on Neville Island, for which Rainey will supply the coal. The coke market also eased off during the month to a $2.75 basis for spot furnace, against better than $3 on an upward wave in March.

The central Pennsylvania district felt cause for gratification in that the market held up better than expected during the early weeks of April. Output for the first half of the month compared favorably with that for the same period in March and prices remained nominally unchanged. There has been a slight increase, however, in the number of "no bills."

IN New England the market continued to be listless. In no direction was there any activity in steam coals, and there was a steady tendency toward lower prices. No. 1 Navy Standard, Pocahontas and New River mine-run were offered recently at $4.10@$4.20, and second grades were easily to be had at $4 flat per gross ton f.o.b. vessel. Even so there were accumulations, and naturally there was no haste on the part of buyers.

Coastwise freights were easier because of reduced demand, and in consequence spot quotations on cars Boston and Providence for inland delivery were lower than at any time since last fall; with $5.25 a top figure for run-of-mine on cars Boston, while at Providence there was a steady pressure to sell against arrivals, with very little spread between nut-and-slack and mine-run. The former was offered at $4.85@$4.90, while mine-run changed hands for as low as $5.10. There seemed every prospect that by May 1 first grades of smokeless mine-run would be offered at less than $5 on cars.

There does not seem to be any working arrangement on West Virginia coals that has any influence on output for more than a fortnight or so at a time. There is the same seesaw of curtailment and overproduction.

Activity in the New York market in April consisted largely of the movement of contract coal, with a fair sprinkling of spot buying. Most of the utilities and other large consumers have closed agreements for supplies and many inquiries were received from smaller industrial plants. The railroads also are coming forward with contract forms, but as a rule the tonnage figures are below those of former years. Spot buyers were notably inconspicuous considering the relatively low level of reserves. Lake shipments, when the season gets fully under way, are expected to have a steadying influence on this market.

AFTER passing through a fairly satisfactory coal year the Philadelphia trade experienced a falling off early in April, which continued throughout the month. However, as stockpiles have been greatly curtailed there continues to be a fair degree of buying for current consumption. Contracting has been slow, though a number of bids have been made recently for public institutions and other large buildings. The railroads seem satisfied to wait out the market, with fair supplies on hand. General business conditions, particularly in the building line, are good and improving. Consequently inquiries are increasing from steel and brick plants and cement manufacturers have been better customers for slack.

In Birmingham the coal market has been generally in an inactive state notwithstanding that spring schedules on domestic fuels have been in effect since mid-March. Dealers have been contracting slowly and the tonnage involved in such agreements is much less than a year ago. Retailers in many instances have definitely deferred the placement of their orders until later in the season. As a result the mines have been hard pressed for operating support and with few exceptions have been working half time at most.

The steam-coal situation in general was better during April than in the preceding month, largely by reason of curtailed production with the lessened demand for domestic grades. The railroads increased their weekly quotas somewhat, but there was no appreciable improvement in consumption by industrial consumers. The bunker trade remained exceedingly quiet.

Demand for steam sizes featured the New York anthracite market in April; so far as the movement of domestic coals was concerned, many declared it was the worst April they could remember. Domestic consumers bought only in small lots and retailers were awaiting further developments following the unexpected cut of 60c., the discount terms and the installment buying plan. Toward the end of the month dealers began buying in order to save the 10c. advance effective May 1. The steam sizes were in restricted supply because of the cut in output, resulting from the slow movement of domestic grades. Many of the orders placed were for immediate delivery.

THE Philadelphia hard-coal market got away to a very slow start last month, due to abnormally warm weather, and many mines were idle during the first ten days. Toward the middle of the month, when there was a drop in temperature, consumer ordering was resumed, but most of the buying was in small lots for immediate requirements.

Nut maintained its leadership in demand, with stove next. Egg, as usual in the spring, also displayed some signs of being in better call; pea, however, was extremely quiet. The steam coals did not give any trouble, for with the mines working on reduced schedules there was just about enough of these sizes to go around.

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

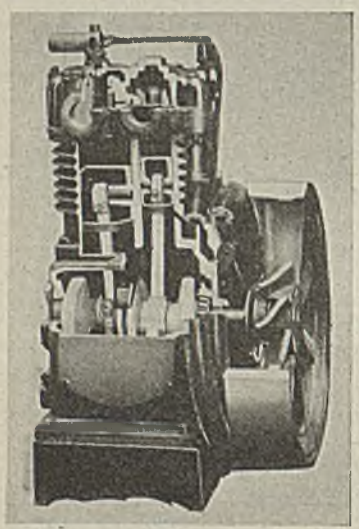
		Week Ended			
MIDDLE WEST	Market Quoted	April 6, 1929	April 13, 1929	April 20, 1929	April 27, 1929
Franklin, Ill. lump	Chicago	$2.25	$2.25	$2.25	$2.25
Franklin, Ill. mine-run	Chicago	2.15	2.15	2.15	2.15
Franklin, Ill. screenings	Chicago	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75
Central, Ill. lump	Chicago	1.75@ 1.90	1.75@ 1.90	1.75@ 1.90	1.75@ 1.90
Central, Ill. mine-run	Chicago	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75
Central, Ill. screenings	Chicago	1.40@ 1.50	1.40@ 1.50	1.40@ 1.50	1.40@ 1.50
Ind. 4th Vein lump	Chicago	2.25@ 2.55	2.25@ 2.55	2.25@ 2.55	2.25@ 2.55
Ind. 4th Vein mine-run	Chicago	1.50@ 1.90	1.50@ 1.90	1.50@ 1.90	1.50@ 1.90
Ind. 4th Vein screenings	Chicago	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75
Ind. 5th Vein lump	Chicago	1.75@ 2.25	1.75@ 2.25	1.75@ 2.25	1.75@ 2.25
Ind. 5th Vein mine-run	Chicago	1.25@ 1.85	1.25@ 1.85	1.25@ 1.85	1.25@ 1.85
Ind. 5th Vein screenings	Chicago	1.10@ 1.25	1.10@ 1.25	1.10@ 1.25	1.10@ 1.25
Mount Olive lump	St. Louis	2.00	1.90	1.90	1.90
Mount Olive mine-run	St. Louis	1.75	1.75	1.75	1.75
Mount Olive screenings	St. Louis	1.25	1.50	1.60	1.60
Standard lump	St. Louis	1.65@ 1.85	1.65@ 1.85	1.65@ 1.75	1.65@ 1.75
Standard mine-run	St. Louis	1.65@ 1.75	1.65@ 1.75	1.65	1.65
Standard screenings	St. Louis	.90@ 1.00	1.25@ 1.35	1.40@ 1.50	1.50
West Ky. block	Louisville	1.40@ 1.75	1.30@ 1.50	1.30@ 1.50	1.30@ 1.50
West Ky. mine-run	Louisville	1.00@ 1.25	1.00@ 1.40	1.10@ 1.40	1.10@ 1.40
West Ky. screenings	Louisville	.75@ 1.00	1.00@ 1.10	1.10@ 1.25	1.10@ 1.35
West Ky. block	Chicago	1.25@ 1.65	1.25@ 1.65	1.15@ 1.65	1.15@ 1.65
West Ky. mine-run	Chicago	.95@ 1.25	.95@ 1.25	.95@ 1.25	.95@ 1.25
SOUTH AND SOUTHWEST					
Big Seam lump	Birmingham	$1.75	$1.75	$1.75	$1.75
Big Seam mine-run	Birmingham	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
S. E. Ky. block	Chicago	1.60@ 2.10	1.60@ 2.10	1.60@ 2.10	1.60@ 2.10
S. E. Ky. mine-run	Chicago	1.35@ 1.65	1.35@ 1.65	1.35@ 1.65	1.35@ 1.65
S. E. Ky. block	Louisville	1.75@ 2.25	1.75@ 2.25	1.75@ 2.00	1.75@ 2.00
S. E. Ky. mine-run	Louisville	1.30@ 1.70	1.25@ 1.60	1.25@ 1.60	1.25@ 1.60
S. E. Ky. screenings	Louisville	.75@ 1.25	1.00@ 1.50	1.00@ 1.50	1.00@ 1.50
S. E. Ky. block	Cincinnati	1.75@ 2.25	1.85@ 2.25	1.75@ 2.00	1.75@ 2.00
S. E. Ky. mine-run	Cincinnati	1.15@ 1.60	1.00@ 1.50	1.00@ 1.50	1.00@ 1.50
S. E. Ky. screenings	Cincinnati	.85@ 1.25	1.00@ 1.30	1.00@ 1.25	1.00@ 1.25
Kansas shaft lump	Kansas City	3.50	3.50	3.50	3.50
Kansas strip lump	Kansas City	2.50	2.50	2.50	2.50
Kansas mine-run	Kansas City	2.50	2.50	2.50	2.50
Kansas crushed mine-run	Kansas City	2.25	2.25	2.25	2.25

WHAT'S NEW

In Coal-Mining Equipment

Timken Bearings Feature Air Compressors

The Curtis Pneumatic Machinery Co., St. Louis, Mo., has placed a new line of air compressors on the market, known as the 75th Anniversary Line of Timken-bearing compressors. These are primarily introduced for use in garages or service stations or in industrial plants where compressed air for intermittent service is required. The complete line

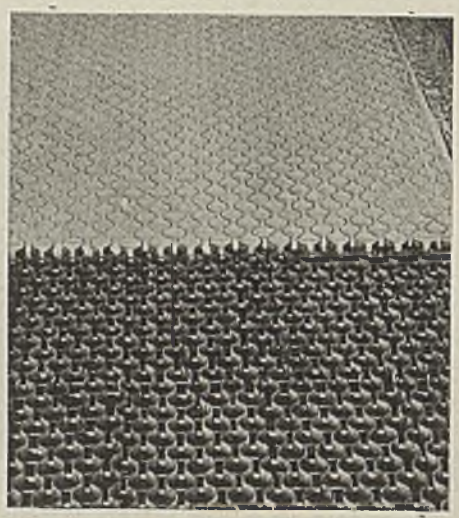


Construction Details: Curtis Compressors

includes eleven models of various types and sizes, ranging from ¼ to 5 hp. and 150- to 200-lb. pressure. Three general classes make up the line: the single cylinder, single stage; the two cylinder single stage, and the two stage. Accuracy and strength mark their construction, according to the maker, and Timken main bearings are employed with effective provision against escape of the lubricant.

Steel Mat Protects Concrete Floors

"Floorgard," a built-up continuous steel mat laid down to form the surface of a concrete floor and to assure long life under heavy traffic, is now offered by the Blaw-Knox Co., Pittsburgh, Pa. The surface of concrete floors is thereby protected against the destructive effects of small-wheeled



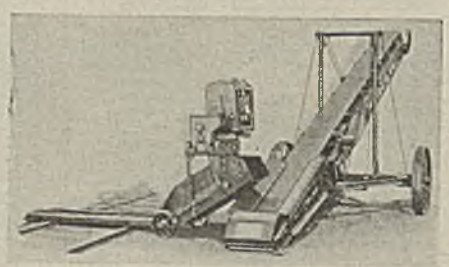
Construction Details: "Floorgard" Surface

traffic and the dropping of boxes, castings and other heavy pieces of material, according to the manufacturer. It is claimed that special skill is not required to lay the reinforcement and that its construction is such that it can be formed to fit any floor requirement. It is made in various sizes of mesh and is recommended for use in machine-shop and warehouse aisles and runways.

Coal and Coke Unloader

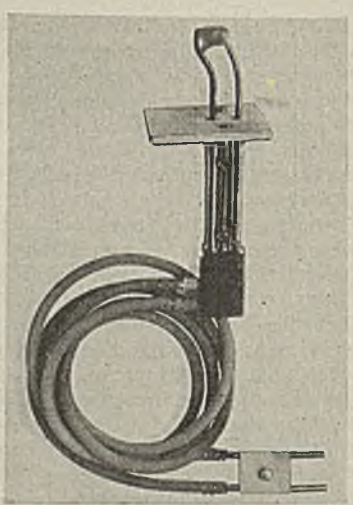
For the man with coal or coke to unload, the Barber-Greene Co., Aurora, Ill., announces a new light car unloader for unloading hopper bottom cars. The maker announces it has a capacity of a ton a minute, a weight of 1,700 lb. and a thickness over the rails of 3⅝ in. It may be obtained with either gasoline or electricity as the motive power and is so balanced that one man can raise one end for moving.

Car Unloader Feeding to Conveyor



Electrode Holder Cooled By Water

An entirely new type of water-cooled carbon electrode holder for heavy-duty manual welding by the carbon arc process has been announced by the Lincoln Electric Co., Cleveland, Ohio. According to the producer, it is designed to insure greater comfort and less fatigue for the operator and tests have shown economy in the uses of electrodes. Efficiency of design allows welding when the arc tip projects only 3 in. from the carbon holder, less carbon area is heated and smaller carbons with higher current density may be used. The size

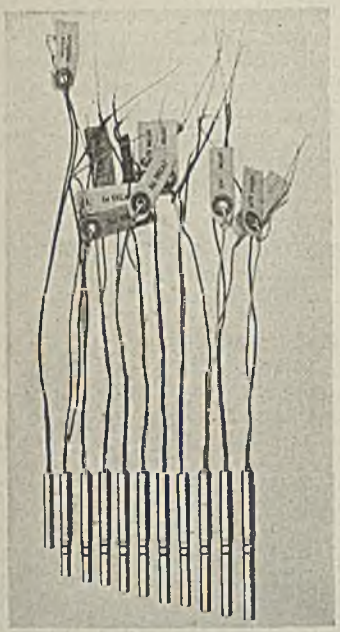


Water-Cooled Carbon Electrode Holder

of the cable leading to the holder has been reduced, it is asserted, by making the hose which carries the water also carry the cable. Consequently a much smaller cable may be used.

Electric Delay Caps Are All-Metal

New delay electric blasting caps which eliminate the former disadvantages of this type of cap have been perfected by the Atlas Powder Co., Wilmington, Del. Former delays were both too thick and too long to be easily embedded in the cartridge and the ordinary fuse employed as the delay element not only demanded a thick rub-



Comparison of Instantaneous Cap and New 1st to 10th Delays

ber coating but had to be provided in sufficient length to assure positive and safe firing periods. The new Atlas delays are of a rigid all-metal construction and their favorable length with respect to the normal cartridge allows, according to the manufacturer, the use of the 10th delay with much the same ease as the ordinary blasting cap. As a result, more delays are available, all of a convenient size, and more precise work should be possible without the necessity of additional boreholes or the larger charges formerly required.

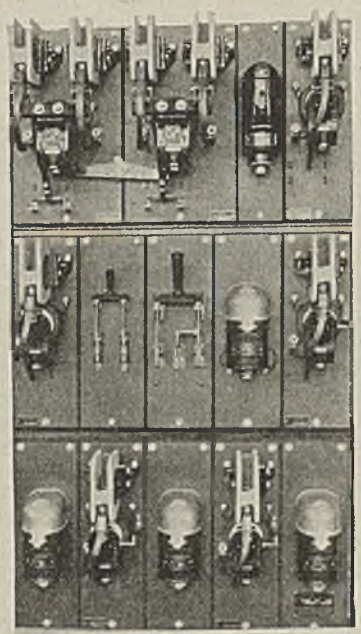
Concentrating Type Unit Lights High Bays

For locations where a powerful light mounted well above the working plane is desired, the Benjamin Electric Mfg. Co., Chicago, announces the new concentrating type unit. This unit, which may be mounted 15 to 18 ft. above the working plane, concentrates the largest part of the light output directly beneath the unit and, according to the manufacturer, gives best results when installed in high, narrow bays where only one or two rows of units are required. The unit is adaptable for either indoor or outdoor use, is light in weight and easy to install. Hoods are furnished for either pendant or outlet box attachment and 750, 1,000 or 1,500 watt lamps may be used.

Provides Powerful Light for High, Narrow Bays

Time Current Control Developed

Maximum output on light loads, automatically increased time on heavy loads and forced acceleration with increased torque until the motor starts are advantages claimed for the new time-current control developed by the Electric Controller & Mfg. Co., Cleveland, Ohio.

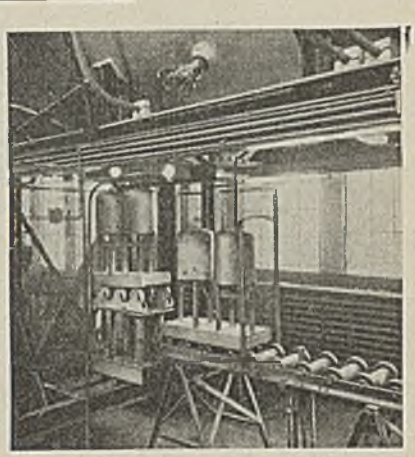


View of Control Device

According to the makers, the time-limit or current-limit methods are not used, the relay operating on an entirely new principle. The control, which embodies the time-current acceleration relay, also uses a complete new line of shunt contactors and a new plugging relay.

Electrical Products Brought Out

New electrical products brought out by the General Electric Co., Schenectady, N. Y., include a brazing furnace and a relay for alarm circuits. The brazing furnace operates in an atmosphere of hydrogen and is automatic, the only labor involved, according to the manufacturer, being that necessary to keep the furnace supplied with material.



Charging Evaporators Into Continuous Hydrogen Brazing Furnace

A roller conveyor carries a row of trays on which the work is placed and motor-operated elevators raise the trays within the furnace. The time of the complete cycle is adjustable between certain limits and the time between motions may be varied from ½ to 1½ seconds.

The relay, designated as CR-2810-1245, is of the normally closed type and actuates a warning signal on the failure of power. Applications are expected to range from simple power failure where no more serious consequences result to more involved circumstances where power failure would result in serious interruptions. The warning signal controlled by the relay may be a bell, a horn, a whistle, a light or other common device, probably energized by batteries.

Small Blasting Machine Is Announced

A new pocket-size blasting machine which, it is asserted, represents a new departure in design, has been announced by the Hercules Powder Co., Wilmington, Del. It is a dynamo type machine, weighing 4¾ lb., and will slip into the ordinary coat pocket. Permanent capac-

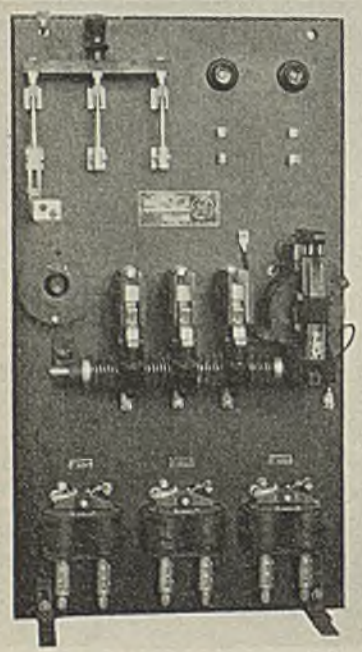
Dynamo Principle Installed For Permanent Capacity

ity is assured by the dynamo principle of design, according to the Hercules company, and it is rated to fire ten electric blasting caps connected in series. The new machine is called the 10-cap blasting machine.

More Room in Cab With New Crane Panels

The General Electric Co. announces the revision of its line of crane protective panels bearing the designation CR-7409. Such panels provide overload and undervoltage protection for all the motors of a crane and are designed to be used with an emergency switch for the operator to use in an emergency. They may be used with either drum switches or magnetic-control panels.

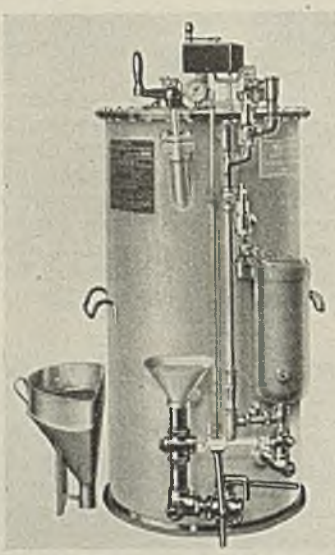
The principal change in the revised line is a regrouping of the units involved, resulting in a marked reduction in total size. Another change is the substitution of instantaneous overload relays. Otherwise the equipment is practically the same as before, except that up-to-date material is used in all cases.



View of Panel

Equipment Designed for Welding Jobs

New products announced by the Oxweld Acetylene Co., New York City, include a high-strength bronze welding rod and a medium-pressure acetylene generator. The welding rod is recommended by the Oxweld company for all bronze-welding applications including the fusion welding of brass and bronze, bronze-welding of malleable and gray iron castings, joining dissimilar metals and building up bearings and other wearing surfaces. Uniformly low melting point and easily controlled flow, tough and ductile welds with a tensile strength of over 45,000 lb. per sq.in. and elimination of boiling, fuming and annoying fumes are other advantages claimed.



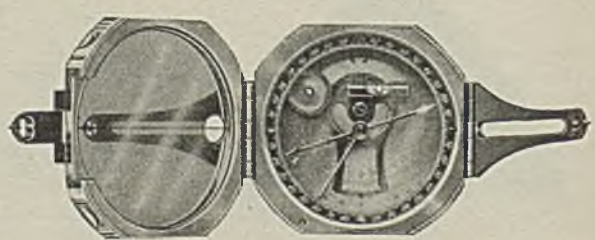
Type MP-101 Acetylene Generator

The acetylene generator, type MP-101, is designed to meet the demand for a stationary or portable generator for use with either medium or low-pressure welding and cutting blowpipes. Safety, dependability, sturdiness, minimum pressure fluctuation during operation, rugged simplicity and ease of operation are claimed. The carbide capacity of this generator is 30 lb. and the quarter size ($\frac{1}{4}$ x 1/12 in.) carbide is used. The total weight of the machine, fully charged, is 623 lb.

Improve Pocket Transit

An improved type of Brunton pocket transit has been introduced by William Ainsworth & Sons, Inc., Denver, Colo. The new model has a round level vial which facilitates leveling of the instrument when measuring horizontal angles, inasmuch as it is easier to level it in this way than by means of the two level vials at right angles that were formerly used.

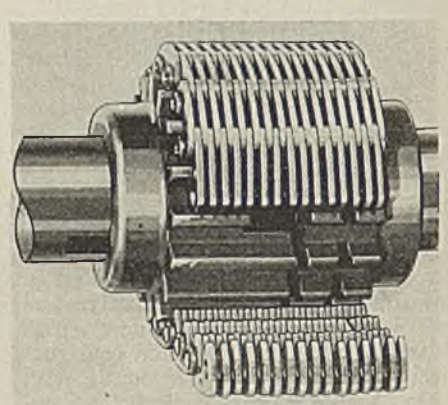
Another feature is that the level on the clinometer vernier is more sensitive than was formerly supplied with the transit. This permits the reading of vertical angles or grades more closely than before. This feature, added to the grade scale, which also is read by the clinometer vernier, and the table of three-place natural tangents stamped on the cover, greatly facilitate the use of the instrument.



Improvements Have Been Made in This Pocket Transit

Flexible Chain Coupling Transmits Power

High efficiency, durability and simplicity are advantages claimed for the Morse flexible coupling, made by the Morse Chain Co., Ithaca, N. Y. It consists primarily of Morse chain wrapping two sprockets, each one-half the width of the chain, one with guide groove in the center of the face to hold the chain in place, the other without groove and free to float under the chain. The chain fits loose enough on the sprockets to take care of ordinary misalignment and lack of parallelism.



Flexible Chain Coupling

Dragline Bucket Offered

Ample strength to withstand dropping or rough handling, rigid side walls, solid construction which resists distortion, bucket arch keyed to the body to eliminate shearing, a single forked rope socket, patented "hump dump" sheave to facilitate ease of handling, renewable cutting lips and teeth and long-life, heat-treated manganese steel are features claimed for the new solid manganese steel "Page Type" dragline bucket manufactured by the American Manganese Steel Co., Chicago Heights, Ill. It may be obtained in $\frac{1}{2}$ to 10 cu.yd. capacities.

Diesel-Drive Drag Shovel Is Convertible

Bucyrus-Erie, South Milwaukee, Wis., announces a new 1-yd. Diesel-driven drag shovel convertible for use as shovel, dragline, crane or clamshell. According to the manufacturer, the machine is simple, stanchly constructed and economical of fuel. Both hinged-bottom and solid dippers are available in sizes suited to several widths of trench.

With standard 24-ft. boom and 8½-ft. dipper handles, the manufacturer claims a maximum digging depth of 21 ft. and a radius of 36½ ft. The clear dumping height for a front-opening dipper is 10¼ ft. and the minimum dumping reach is 19½ ft. The solid type dumps within a radius of 17 to 30 ft.

D-2 Diesel Drag Shovel

Expands Line of Paints

The Joseph Dixon Crucible Co., Jersey City, N. J., announces several important changes in its line of paints. The industrial paints, known as "Silica-Graphite" paints, have been increased from eight to fourteen colors, which include a straight aluminum paint and also a standard red-oxide paint. This color range, according to the company, meets in a most complete way all standard color requirements for metal and wood protective coatings and the bright aluminum paint contains a durable spar varnish as its vehicle, giving great resistance to the elements and insuring the life and brilliancy of the aluminum pigment. There is no precipitation of pigment.

Utility paints have been added as standards, three of which are graphite-pigmented; the fourth, oxide of iron. These paints, it is claimed, have all the qualities of a good protective coating, at a lesser cost, and were designed for use on "general run of work." They are made in four standard colors.

Maintenance floor paints have been developed for the protection of wood, composition, linoleum, cement and concrete floors. Being immune to the action of alkali, the company claims that they are unexcelled as cement- and concrete-floor coatings, will effectually prevent "dusting" of concrete floors, may be used inside or out and will withstand the rigors of sleet, rain, snow and climate changes. These paints are made in eight standard colors.

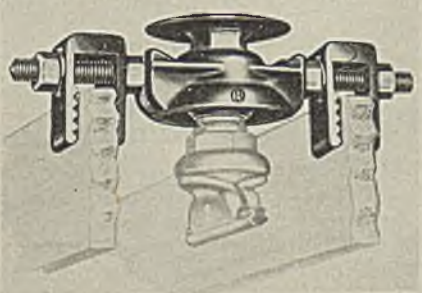
Dual-Application Hanger For Guard Board

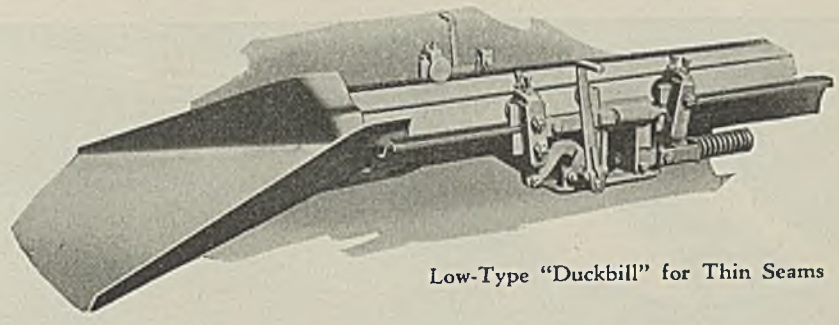
The Ohio Brass Co., Mansfield, Ohio, announces a new hanger which insulates the trolley and at the same time affords an easy and quick method of supporting guard board. The shell of the hanger is slotted on two sides for engaging the heads of ½-in. bolts. By inserting the bolt heads in these slots a rigid and secure anchorage for the bolts is obtained. Drilled holes in the guard board permit direct attachment or specially designed clamps suspended from the bolts may be used to clamp the guard board tightly in place.

While this new hanger is being manufactured primarily to facilitate the installation of new guard-board construction, the manufacturer states that it can be used to great advantage as a regular line hanger where the installation of guard-board protection is contemplated at a later date. Guard board then may be installed at any time without difficulty, as hangers especially adapted to supporting guard board are already on the line.

The hanger body has a 3¼-in. diameter shell; height, 2 in.; made of O-B Flecto iron, hot-dip galvanized. Corrosion will not affect the assembly, as no holes are drilled in the hanger shell; the assembly merely slips into the cored slots on the hanger. Insulated with O-B Dirigo insulation, it is regularly furnished without petticoats to facilitate cleaning.

Dual-Application Guard-Board Hanger Installed





Low-Type "Duckbill" for Thin Seams

Low Duckbill Works In Thin Seams

The Rock Springs Loader Co., Rock Springs, Wyo., announces the perfection of the new low-coal "Duckbill" for use with the Universal shaker loader. Several advantages are claimed for the new machine. As its over-all height is only 19.5 in. it can work to capacity in a 24-in. seam. It may be operated from either side without the handle transmitting shock to the attendant. The machine will advance into a pile of coal up a pitch as steep as 16 deg. with the minimum of effort on the part of the operator.

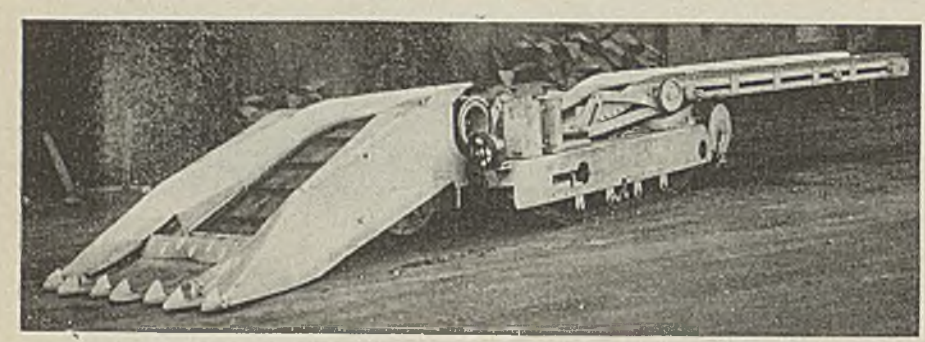
When equipped with the trailing grip, the forward movement is accomplished by raising the hand lever to a vertical position and holding it until the shovel has advanced the required distance. To retract the shovel the hand lever is brought to the vertical and moved forward and backward through a short arc which is synchronized with the movement of the shovel. In level or slightly ascending places the trailing grip is disconnected and the shovel advanced by a slight rocking of the operating lever.

According to the manufacturer, the new "Duckbill' is simpler and easier to operate than the old and can be easily managed by the operator while standing, sitting or lying on his side in low seams. The new design allows the weight to be reduced without sacrificing ruggedness.

Coal-Loading Machine Recently Developed

Few parts, simple and rugged construction and a new loading principle are features claimed for the "Covington" loading machine, developed by the Covington Machine Co., Covington, Va. The makers state that the coal is loaded as shot down and not reduced to slack, that lumps up to clearance limits can be loaded with ease, that the loading action is continuous and that the shovel does an excellent job of cleaning up a place.

In operation, the machine proceeds into the place under its own power and the front end is lowered to the mine floor with the front motor running and



Covington Loader Assembled

operating the first conveyor and the reciprocating head. The main motor is then employed to force the shovel into the loose coal. When this is cleaned up the spear heads are forced under the standing coal, pulling it down so that it also can be loaded. The front end is raised when the place is cleaned up and the machine proceeds to the next.

Six controls are provided, as follows: One controller for operating front digging motor, front conveyor and rear conveyor; traction motor controller; two clutch levers for manipulating machine on crawlers; hand friction wheel for raising or lowering front end and a controller for the boom-swinging motor. The main drive unit is a totally inclosed General Electric HM 14 mine locomotive motor geared directly to the clutch shaft. A disk clutch operates each crawler chain.

The rear conveyor is driven and the boom swung by two 3-hp. General Electric motors, and the digging-end conveyor and reciprocating conveyor are operated by a duplicate of the main-drive motor. According to the company, the width of the machine is 6 ft.; height to top of conveyor, 33 in.; length, 15½ to 18½ ft., and weight, 7½ to 9½ tons, depending on the type. It can be furnished to operate on crawlers, on the mine track or a combination of the two.

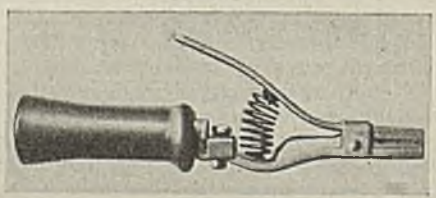
Gasoline Hoist Affords Dragline Operation

The American Hoist & Derrick Co., St. Paul, Minn., is now marketing a newly designed gasoline hoist powered with a Waukesha motor. Power is transmitted to the hoist by a socket chain drive and is delivered to what would be the crankshaft on a steam hoist—the logical place, according to the makers, to apply it. Mounted on a five-ton motor truck it is claimed that this hoist constitutes the power plant of a productive and portable dragline installation.

Ready for Dragline Operation

New Electrode Holder for Metallic Arc Welding

The Lincoln Electric Co., Cleveland, Ohio, announces an improved type of electrode holder, known as the Type T, for metallic arc welding. According to the company, the holder consists essentially of a powerful clamp to hold the welding electrode firmly while welding and it has an easy release feature which permits changing electrodes quickly.



Improved Type T Electrode Holder

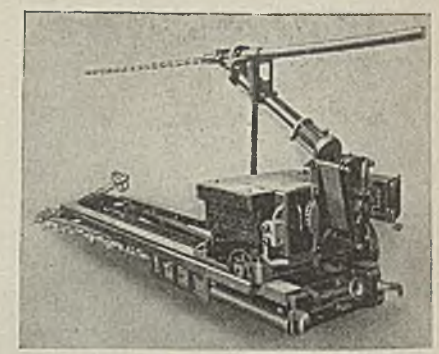
The handle grip is designed for easy holding and it is asserted that the holder operates at a low temperature as the welding current is carried from the point of cable entry to the copper jaws by copper strips of low resistance.

The copper tips on the jaws reduce the sticking of the electrode to the jaws, resulting in faster and easier changing of electrodes and longer life for the holder. The shape of the holding clamps has been altered to give greater compactness and permit work in close corners. All metallic parts of this holder are coated with non-tarnishing cadmium plating. Each holder is packed in an individual carton, which facilitates shipping and storage.

Power-Drill Attachment Converts Machine

Something new in attachments is the new power drill developed by the Goodman Mfg. Co., Chicago, for installation on the breast-type mining machine. According to the maker, the drill is self-contained, can be easily attached without changing the machine and is similar to the "hitch drill" though designed to fit the breast machine and cut smaller holes.

Holes 1 to 5 in. in diameter may be drilled and it is asserted that the flexible adjustment allows them to be placed where desired. Power is supplied by the breast-machine motor and is regulated by a hand-controlled friction drum. According to the Goodman company, the installation of one of these drills will convert an obsolete breast machine into an excellent entry driver—one which will compete with many later types.



Drill Mounting for Breast Machines

Hole Boring Eliminated By Dead-End Sling

Boring of holes through poles to dead-end a transmission line has been eliminated by the new dead-end sling of the American Cable Co., Chicago. Preformed rope obviates the cumbersome and impractical features of former types of rope slings, according to the makers, and the fittings are pressed on hydraulically and locked unfailingly to the rope. This type is recommended by the company for all places where a sling may be used to advantage.

Eliminates Holes in Poles