COAL AGE

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

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Editor

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Coal Versus Oil

LOW as are the prices of coal it, nevertheless, has to face in places a keen competition with oil. Fuel oil is being sold under a three-year guarantee to the U. S. Shipping Board at New York City at 92c. per barrel, equivalent to a price of $3.93 a ton for bituminous coal of good grade delivered at tidewater. Deducting a bunkering cost of from 18 to 25c, that would admit of a price of $3.75 to $3.83, assuming that coal were as easy to fire as fuel oil. This price might indeed be met in small volume with slack, but with hand firing four times and with pulverized-coal firing three times as many men are required and there are additional costs for equipment, coal crushing, bunker space and upkeep.

CONSEQUENTLY, despite all the success with the Steamer "Mercer," pulverized coal will have hard sailing till the price of oil once more increases. When the experiments on the "Mercer" commenced the price of oil was $1.80 a barrel here and more across the seas. But the price has sagged so much that the U. S. Shipping Board will use more oil than coal.

IT IS a matter for encouragement that despite decreasing oil costs the Shipping Board will continue its experiments. It is testing other pulverizers and burners and intends before long to turn two more ships to pulverized coal. Few, if any, believe that oil prices will continue at their present low level; few, however, ever suspected they would fall so low.

BUT outside of tidewater, coal does not have the difficult competition it has on the coast. When oil has to be transported by rail it usually finds itself, even today with its present low prices, on an inferior footing to coal. The tendency away from fuel oil has been marked. The railroads have steadily reduced their oil consumption in recent years; so also have the public utilities. This has continued through the present year with the three months of record with the railroads and with four months of record with the public utilities. In 1927 the latter used 28 per cent less oil than in 1926.

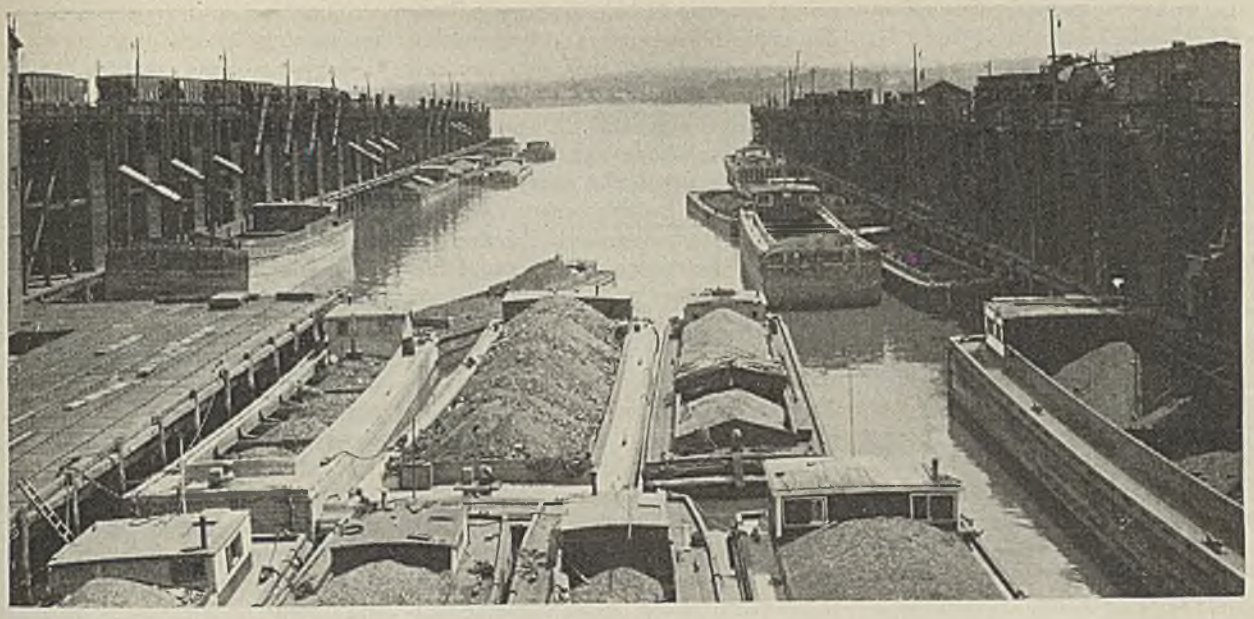
OVER 368,000,000 barrels of domestic fuel oil are still used, displacing over 86,000,000 tons of coal, 42,000,000 barrels of foreign oil displacing 10,000,000 tons of coal and a trillion cubic feet of natural gas, the equivalent of about 43,000,000 tons of coal. The industry should be prepared to show the method of burning coal that will give the greatest heat with the least quantity of fuel consumed. Then there will be no tendency toward oil and natural gas. The public utilities, which are good judges of economical combustion, have shown by their trend that oil burning does not pay at prices today and hitherto ruling.

TO DISPLACE fuel oil and gas nearly 139,000,000 tons of coal will be needed each year. Surely this is worthy of the careful consideration of the industry. Cannot some of this business be recovered by burning coal more efficiently?

Courtesy Anderson Galleries, N. Y.

Unloading Coal at Buenos Aires

From a Painting by
Benito Quinquela Martin



How Anthracite Attacks Sales Problems

By Sydney A. Hale
Managing Editor, Coal Age

MERCHANDISING, already a major issue as a result of post-war changes in the Pennsylvania anthracite set-up, has been thrust to the front as the outstanding problem of the industry since the long strike of 1925-26. During the war years and, to some extent, in the years immediately following, "the market question" intruded so covertly that the industry as a whole seemed hardly conscious of its existence. The problem was still largely one of apportioning tonnage among eager buyers whose demands were of such volume that it obscured the effects of competitive inroads close to home and declining sales in distant markets.

As these effects began to be better understood, however, there was an increasing interest in the merchandising phases of the industry. This was first noticeable perhaps in a concentrated drive to establish No. 1 buckwheat as a domestic fuel—a drive forced upon the producers by the collapse of the market enjoyed by the steam sizes during the war and the intensified competition from cheaper fuels. Pea, an uncertain quantity since its elevation to domestic rank in 1912, also grew more than usually troublesome. An attempt was made to meet general criticism of sizing and standards of preparation for the larger coals.

The 1925-26 strike gave a temporary setback to the expansion of an industry merchandising program because the heavy buying which followed the resumption of operations lulled some producers into a false sense of security. But the production record of last year furnished an effective alarm clock. In 1927, the anthracite breakers loaded only 68,465,537 net tons of coal for shipment—the smallest tonnage, barring the strike years of 1922 and 1925, shipped from the breakers since 1909.

COMPARED with 1924, the year immediately preceding the big 1925-26 suspension, the 1927 breaker shipments showed a decrease of 7,237,805 tons, or 9.56 per cent. If sizes below pea are excluded, the decrease was 7,625,350 tons. Including local sales, steam shipments and dredge and washery product the decrease under 1924 was 6,749,482 tons.

To a large extent this decline may be attributed to the competitive inroads made by electricity, gas, fuel oil, bituminous coal, coke and foreign fuels. At the present time electricity for home heating is a minor factor; gas is expanding but is still in the luxury class. Fuel oil is a very active competitor and promises to continue so for some time to come. Competition with foreign fuels is confined to the Canadian markets and to New England seaboard cities, principally Boston and Providence and their environs. Bituminous coal and coke loom largest. From the standpoint of tonnage, bituminous coal leads, but coke is the more dangerous competitor because of the growth in public-utility owned byproduct plants.

The decline in 1927 shipments and local sales when compared to 1924 figures indicates that competitive fuels have held approximately 50.19 per cent of the business thrown their way by the 1925-26 strike. This per-

centage is based upon figures on increased sales of competitive fuels for domestic heating in 1925-26 published by the U. S. Bureau of Mines (Tryon and Bennit, "Anthracite in 1926," pp. 3-7). That study estimates that hard coal consumers in those two years were compelled to use the equivalent of 27,100,000 net tons of competitive fuels to make up a deficit of 25,000,000 net tons of anthracite.

THE increase in sales of competitive fuels in 1925 and 1926 over 1924 was divided as follows: American briquets, 674,000 net tons; foreign briquets, 130,000; European anthracite, 961,000; byproduct coke for domestic heating, 3,516,000; beehive coke, 499,000; gas-house coke, 500,000; foreign coke, 320,000; fuel oil, the equivalent of 3,500,000 tons; bituminous coal, 17,000,000 tons.

These gains, of course, directly support one of the principal explanations advanced for the increasing difficulties in the marketing of anthracite—insecurity of supply. Interruption in supply of hard coal is one of the major counts in the popular indictment of the United Mine Workers. During the ten years ended Dec. 31, 1927, the anthracite mines worked 2,452 days out of a theoretical full-time 3,040 days. During that same period strikes were responsible for the loss of 371 days, or 12.2 per cent of possible full-time, and other causes, 217 days, or 7.1 per cent.

The record in the big strike years naturally is much worse. In 1922, strikes and lockouts caused a loss of 138 days, or 45.4 per cent of the possible running time; in 1925 the strike loss was 103 days, or 33.9 per cent, and in 1926, 41 days, or 13.5 per cent. That these losses have given impetus to the sale of competitive fuels is a matter of common knowledge. The menace frequent strikes held for the industry was one of the moving considerations in the long-term agreement of 1926.

THERE are, however, two other factors which have contributed in no small measure to the increased sale of competitive fuels in anthracite-consuming territory. Price has played its part with consumers compelled by circumstances or inclined by nature to weigh expenditures carefully.

But the allure of convenience probably has made a still greater appeal and has robbed anthracite of some of its most desirable customers. The gas man and the fuel-oil distributor have laid great emphasis upon this point and the latter appears to have led many householders to believe that automatic heat control was peculiar to oil-burner installations. This is a push-button age, and the competitors of hard coal have not been slow in capitalizing upon that fact.

These two factors—price and convenience—have worked together to increase the potency of complaints against quality and preparation of anthracite shipped to the domestic consumer. That irresponsible agencies took advantage of the demands born of the war-time and strike crises in supply and sold tonnage the quality of which would have shamed a respectable bootlegger is openly admitted in the industry. That more reputable producers at times have permitted the loading of coal substandard in preparation or sizing likewise cannot be denied.

These sins have been so magnified in the public mind that the average domestic consumer of coal ascribes all his heating ills to poor or imperfectly prepared fuel. And with competitive fuels available and their use made easy there are many householders who take an unholy delight in announcing their release from the thralldom of anthracite. That the dash for freedom often has been taken without the householder really knowing what he was trying to escape has not always helped the anthracite industry.

THAT the majority of the anthracite operators are not unmindful of the seriousness of the situation confronting the industry is shown in the present trend of executive thinking. These operators have a clear picture of the difficulties to be overcome and are moving in concert and as individuals to meet them. At the same time there still remains an uncomfortable fringe of optimists who are waiting for God and the weather to restore hard coal to its war-time position. Fortunately, this minority is not large.

The head and front of the industry's group attack upon its merchandising problems is the Anthracite Operators' Conference. The Conference, representing both the old-line companies and the independent producers, is devoting a large part of its time to distribution questions. It has done much to improve retail contacts.

One evidence of this change was the creation of the office of vice-chairman as a full-time job. For this post the operators picked a man who had had wide experience in creating favorable public relations for business enterprises.

ANOTHER byproduct of this work has been the greater participation of anthracite executives in the meetings of retailers. The "high hat" attitude which was criticized in these columns three years ago (*Coal Age*, Vol. 27, pp. 538-40) is vanishing. Public relations have been measurably improved.

Through its merchandising committee the Conference enjoys a free exchange of opinion on common questions of marketing and what should be done to improve merchandising. Out of this committee recently came a recommendation upon sizing standards to replace the standards adopted in the spring of 1925. The latest standards make a 1 per cent reduction in the permissible slate in egg, stove and nut, reduce the maximum undersize in nut and pea and also establish screen standards for steam sizes.

There is no change in the test-screen standards set up March 20, 1925 (*Coal Age*, Vol. 27, pp. 436, 477), but the new recommendations also definitely establish breaker-screen standards and maximum permissible wear upon such screens before removal. The testing-screen mesh, permissible oversize, undersize and impurities are shown in Table I.

The 1925 standards, hailed as a forward step at the time of their adoption, were disregarded by many producers despite the fact that it was

Table I: Anthracite Preparation Standards

(Round-mesh Screens)

Size	Testing Screen Mesh Through Inches	Testing Screen Mesh Over Inches	1925 Standards — Maximum Permissible — Undersize	1925 Standards — Maximum Permissible — Slate Per Cent	1925 Standards — Maximum Permissible — Bone	1928 Standards — Maximum Permissible — Undersize*	1928 Standards — Maximum Permissible — Slate Per Cent	1928 Standards — Maximum Permissible — Bone
Broken	4 3/16	3 3/16	15	2	2	15	2	2
Egg	3 1/16	2 1/2	15	3	3	15	2	3
Stove	2 1/2	1 7/16	15	4	4	15	3	4
Nut	1 7/16	3/4	15†	5	5	10	4	5
Pea	3/4	1/2	15	7 1/2	7 1/2	10	7 1/2	7 1/2
Buckwheat‡	1/2	1/4	..	..	..	..	..	..
Rice‡	1/4	1/8	..	..	..	..	..	..
Barley‡	1/8	1/16	..	..	..	..	..	..
Boiler	1/4	1/8	..	..	..	..	..	..

* Permissible oversize, broken or buckwheat inclusive, a maximum of 5 per cent.
† Plus not more than 5 per cent unavoidable breakage.
‡ Not covered in 1925 standards.

stated at the time of their promulgation that 98 per cent of the tonnage had agreed to the specifications. Recent inspection tests show some shipments of nut and pea leaving the breakers with as high as 38 per cent oversize and the undersize down to 5 and 6 per cent. The breakdown of the 1925 standards while helping to improve the quality and preparation from some collieries left the situation badly confused. It is the hope of the operators that general acceptance of the new standards will result in greater uniformity without degrading quality or preparation, which at present is winning high praise.

Through the Conference and its subsidiary organization, the Anthracite Coal Service, some progress is being made with manufacturers of heating equipment for the home. Until recently the pronounced apathy of many of the makers of standard furnace equipment has been one of the most discouraging obstacles encountered. The story is told of one manufacturer who ignored requests for a fuel engineer and when finally cornered said: "Why, we have no engineers. The only change in patterns or design in our product since 1890 has been in scroll work."

WHILE this represents an extreme case, it is a fact that many manufacturers have appeared very indifferent to the possibilities of experimentation along the lines of more efficient and mechanized combustion in the home. The use of buckwheat in ordinary furnaces, for example, was blocked because manufacturers showed no interest in supplying a grate at an attractive price. This indifference is breaking down. At the same time the makers of some of the special equipment for burning buckwheat are pushing sales more vigorously. Much, however, yet remains to be done both in sales promotion and in equipment design. The importance of the equipment question has been clearly established by inspections made of heating plants of the domestic consumer. In the case of one organization, out of 6,000 inspections made on complaints against coal quality, it was found that 98 per cent of the complaints actually were due to the condition of the equipment. And yet it seldom occurs to the householder when he is unable to heat his home properly that his furnace may be at fault.

Generally he is like the professional man who was at a dinner party last fall at which an executive of one of the large sales agencies also happened to be a guest. The professional man, with some glee, told the coal man how sorry he felt for the industry with its problems of mining and trying to sell inferior fuel, but added that his grief was not great enough to make him continue to use coal—not when the furnace that once used 12 tons now ate up 18 tons without heating the house. He was going to install an oil burner!

STATEMENTS that sizing and preparation of anthracite never were better were received with polite incredulity. The professional man was willing to concede, however, that, if he could get old-time satisfaction out of his equipment he would continue on coal. Thereupon the coal man asked him to submit to an eight-question "intelligence test."

"What make of car do you drive?" began the inquisitor.

The professional man named it.

"How often do you have it gone over?"

"Twice a year as a matter of routine and more frequently when necessary."

"How often do you have your carburetor adjusted?"

"Twice a year or more."

"What brand of gas do you buy?"

The name of a well-advertised brand was promptly given.

"What is the make of your furnace?"

The professional man didn't know.

"How often do you have it gone over?"

"Do you have to give your furnace attention?" exclaimed the professional man in surprise.

"How often do you adjust its carburetor?"

The professional man explained that his was an old furnace without any such modern improvement and the coal man countered by telling him the dampers served the same purpose in a furnace as a carburetor in a car.

"What brand of coal do you burn?"

"Why, just coal."

And subsequent inspection proved that all that was wrong was an accumulation of soot which was effectively insulating the heating plant.

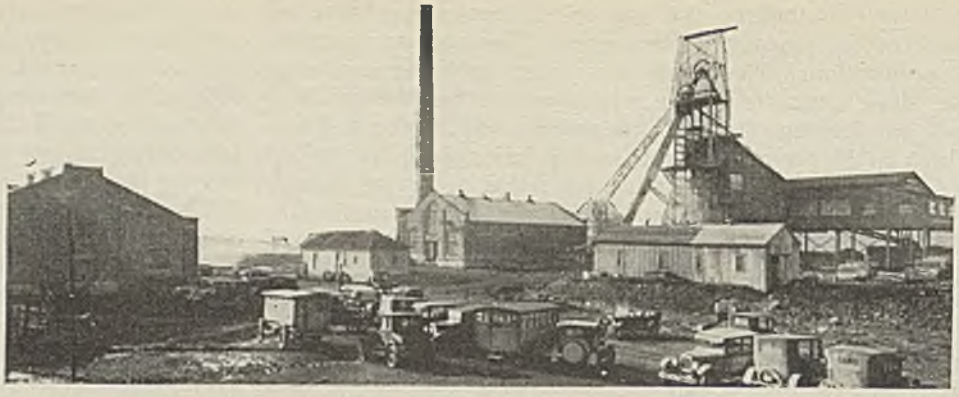
ANOTHER activity which the Conference is pursuing is research. This is one of its latest undertakings. Instead of an ambitious pre-planned program, however, the operators are wisely seeking counsel of recognized combustion authorities in an endeavor to determine along what lines actual, practical research may be most profitably undertaken. One question which probably will receive consideration is the possible use of small coal in gas manufacture to recover the market once held by large anthracite.

The most active agency of the operators in the direct promotion of merchandising developments is the Anthracite Coal Service. This organization, the offshoot of an unsuccessful venture in the promotion of a specialty heating device, has grown from one man to 75. Originally devoting most of its energies to holding business for the steam sizes of anthracite, demand has forced the Service to give more and more attention to retail distribution problems.

Out of this work has developed the combustion schools for retailers. These schools train the employees of the retail coal merchant in the fundamentals of combustion, plant inspection and servicing the consumer. Starting at Trenton, N. J., since January, 1927, the Anthracite Coal Service has trained 1,261 representatives of 769 retail companies in 46 communities and is now conducting classes in 24 cities where nearly 600 employees of over 300 dealers are enrolled.

IN CITIES where the training course has been completed or is well advanced co-operative newspaper advertising on a 50-50 basis is open to the dealers. A monthly pamphlet, *The Anthracite Salesman,* featuring methods of retailers in merchandising anthracite and suggestions for increasing and improving business, goes to 12,000 retailers. Another publication, *The Anthracite Coal Service Magazine,* goes to 10,000 engineers, architects and building owners in an effort to impress upon them the advantages of hard coal. In addition the engineering corps is at the call of retail distributors.

This spring a group of companies, including a number of independent producers and all but two of the former railroad coal companies, launched a co-operative newspaper advertising campaign in the large cities in the anthracite-consuming territory. This is being followed up by a 24-sheet poster billboard campaign started in June. The group in this venture are advertising their product as "CERT-I-FIDE ANTHRACITE." Retail distributors are furnished metal signs featuring this name and also stickers to place on delivery tickets. Approximately $500,000 was appropriated for the first year's campaign.



MECHANICAL LOADING

With A.C. Power Meets Test at Francisco

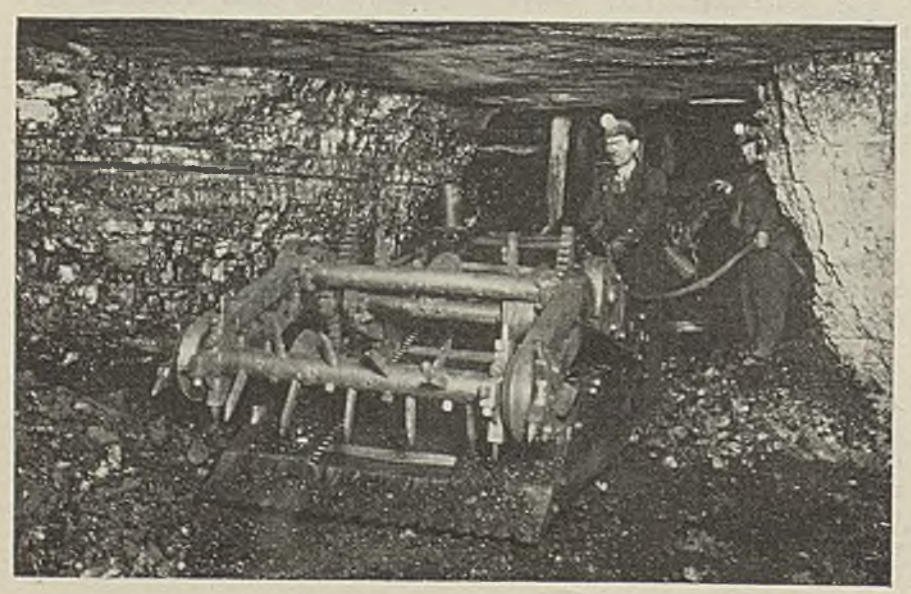
By John Mosbey
Mine Superintendent
Francisco Mining Co.
Francisco, Ind.

WHEN mechanical loading was being considered for the Francisco Mining Co.'s No. 2 operation, about seven miles east of Princeton, Ind., J. R. Henderson, manager, and the other officials agreed that the system adopted must first show success with the old tried and proved mining system. There would be too much risk involved in going to a new plan of working coincident with a change to mechanical loading.

The new Sullivan Class MC2 loading machine was selected for a trial, and the first one was installed Aug. 25, 1927. Later another of the same type was purchased. Operation during the first few months could not be classed as satisfactory, but in January the situation was changed and successively better averages were made in February and March.

The mine is in the No. 5 vein, which lies practically level and under a uniform cover of 300 ft. The average coal thickness is 6½ ft., and about 22 in. from the top there is a 1-in. parting of carbon shale. The bottom is a fireclay which becomes soft if wet, but fortunately, considering this condition, the mine is quite dry. Above the coal is a slate which makes a fairly good roof. Because the mine is dry and gassy, all entries are kept thoroughly rock-dusted.

Loading Head-Machine in a Breakthrough



The present system is to drive 24-ft. rooms 250 ft. deep on 40-ft. centers and to leave the pillars. The track is placed in the center of the room and two rows of props are set on each side to about 14 ft. of the face. The coal is undercut to a depth of 6 ft. with a shortwall machine, making each cut yield about 36 tons. The mine operates with union labor.

Because of the ability of the loading machine to dig as well as load, the coal is not shot so hard as to roll it all down free of the face; instead, some of the cut stands. The loader is mounted on crawler treads and carries at the front end a reversible pick cylinder which can be lowered to the scoop nose, raised to a position about 6 ft. from the floor, or operated at any intermediate position.

THE loader has sufficient traction to force its nose well under the loose coal and to load it without the aid of the pick cylinder. With the picks at the lowest position and moving upward against the coal the machine can dig its way into the standing coal and if the picks are raised and reversed in motion it can pull the standing coal down onto the conveyor. Five feet or slightly less is the lower limit of

height for convenient operation of the size machine which we use.

To insure good operating voltage without heavy expense for d.-c. feeders, a.c. was chosen for the loading-machine power distribution. It is my understanding that few other mines use a.-c. loading machines. Our experience to date has convinced us that the a.-c. system is entirely satisfactory and makes it easy to keep full voltage on the motors.

The loading-machine motors are wound for 220-volt three-phase 60-cycle power. Feeders carrying 2,300 volts enter the mine through drillholes kept within 3,000 ft. of the loading machine. The change to 220 volts is made in a truck-mounted sub-

Machine on the Move

station consisting of three 25-kva. transformers and an oil switch.

These items of equipment are housed in a box or tank of $\frac{1}{8}$-in. steel, the cover of which will fall closed in case of fire. The 2,300-volt rubber-sheathed cable feeding this portable transformer bank is carried in an air course from the bottom of the drillhole. Three No. 4/0 single-conductor rubber-covered double-braid wires hung on knobs along the ribs form the 220-volt secondary distribution. The transformer truck is moved at intervals so as to hold the length of the 220-volt line to 1,200 ft. except where local conditions make it advisable to extend the distance to as much as 2,000 ft.

With hand loading three shotholes are drilled per place, but with mechanical loading the number has been increased to six, yet the total amount of explosive used per place is less—$3\frac{1}{2}$ to 4 lb. instead of 5 to 6 lb. Three snubbing shots are fired before shooting the top holes, but the coal loosened by the snubbing shots is not moved prior to firing the upper shots. Permissible explosive is used. The charges are $1\frac{1}{2}$ sticks each in the top rib holes and one stick each in the others.

The two machines work a complete panel, including room necks and entries. Work of the loading machine crew, consisting of two men, is made less irksome by a practice of sprinkling the face after shooting, so that very little coal dust gets into the air during operation of the loading machine. The sprinkling is done from a car-mounted tank 29 in. in diameter and $7\frac{1}{2}$ ft. long. One tank full of water sprinkles two places. Care must be exercised not to use too much water because an excess will cause trouble for the loading machine by softening the bottom.

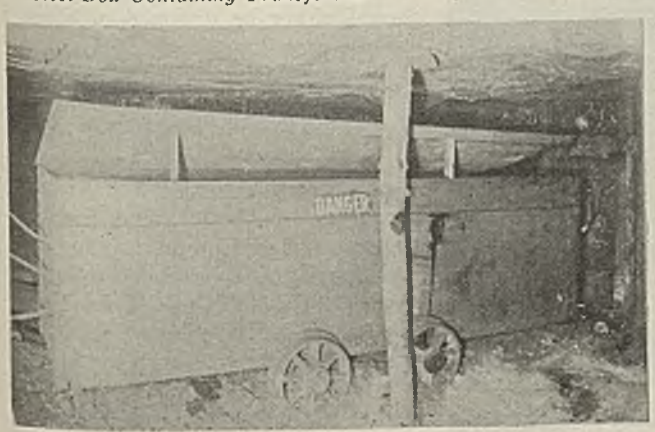
Productions per machine are indicated by the following averages: For the 23 working days in February one machine produced 202 tons per day and another 212 tons. Peaks for each were 274 tons and 237 tons respectively. For the 24 working days in March the average for both was 239 tons per machine per shift.

Time studies were made for several days in order to determine and classify the lost-time items. On a day when one machine loaded 102 cars, or 257 tons, the total of 8 hours was taken up as follows: Loading coal, 39.1 per cent; shifting machine, 8.1 per cent; car changing, 32.5 per cent; moving machine, 7.2 per cent; cars off track, 0.6 per cent; delays gathering motor, 1 per cent; delays parting motor, 8.5 per cent; power off, 0.1 per cent; machine disability, 0.2 per cent, and other delays, 2.7 per cent.

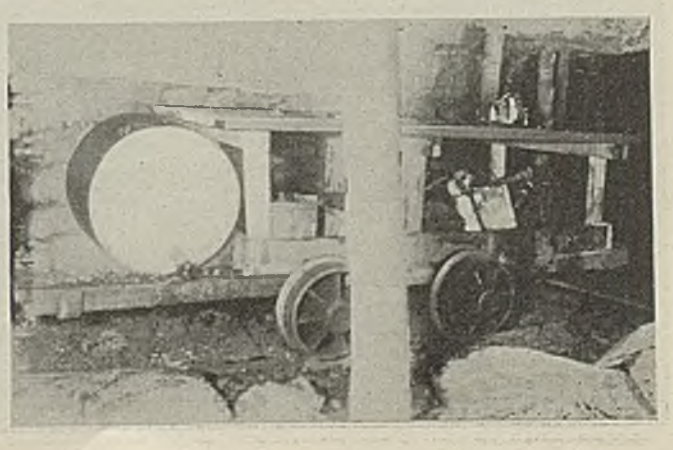
THE crew per machine, including all operations necessary to deliver the coal to the main-haul parting, figures $13\frac{1}{2}$ men. Nine men are concerned directly with each machine and nine other men split their time between the two machines. We know that it is possible to get at least 50 tons more per machine by adding to the crew, but as yet we have not determined if this would be an economical step.

An important feature contributing to the success of the loading machines is the use of a service truck on which is carried a barrel of lubricating oil, jacks, repair tools and a few common supplies. A heavy vise is mounted on the top deck of the truck. The night repairman takes this truck with him to each loading machine. His chief duty is oiling and inspection, but by having the truck with him he is prepared to make a thorough job of any repairing found necessary. The total

Repair Truck With Barrel at One End and Vise at the Other



Steel Box Containing Transformer



time per day put in on oiling, inspection and repair averages about 5 hours per machine.

Each loader is tended by a storage-battery locomotive which shifts cars to room breakthroughs. One track, located in the center room, serves as the outlet for each group of three rooms. From the main-haul parting to the rooms the cars are handled in trips of five by mules or cable-reel locomotives.

Now that the loading machines have proved successful without change in the mining system we expect to try driving rooms 33 ft. wide and double track them so that little time will be lost in car changing. Roof characteristics demanding the placing of center props too close to the face may block this method.

With hand loading approximately one-half of the 1-in. parting was thrown out at the face. With the present system of mechanical loading all of this has to be removed at the tipple, which means that men had to be added to the picking force.

The percentage of screenings in the machine-loaded coal is practically the same as that from hand loading. There has been a slight decrease in the proportion of 6-in. lump, but the exact amount has not been determined. The coal is prepared in a modern five-track steel tipple equipped with three picking tables, the conveyors of which extend over the respective loading booms.

Compared to hand loading we have determined that with machine loading the cost of coal delivered onto the parting is 25 per cent less. This takes into consideration all labor, supplies, powder and the interest and depreciation charges on the machine.

Loading from the Corner of a 26-Ft. Room

As a result of this saving and the experience to date with the Sullivan loading machine it is the plan of Mr. Henderson to put the whole mine on this type of mechanical loader as fast as market conditions justify an increase in tonnage. It is quite likely that within a year or two the mine will be producing 3,000 tons of machine-loaded coal per day.

INHERENT ASH *a Misnomer*

By H. G. Turner
Assistant Professor of Geology
Lehigh University, Bethlehem, Pa.

THE term "inherent ash" appears very frequently throughout the literature dealing with the constitution of coal. It was originally used as a term to indicate a measure of the inorganic constituents of the plants from which coal was derived, but now its meaning is very much in doubt. In some collieries it is used to indicate the ash after the coal has been freed from bone, slate and other mineral associates through commercial sink-and-float cleaning or other methods of washing. In the latter case the "inherent ash" would vary with the methods of cleaning.

The term "inherent ash" is entirely misleading even in its original sense, as we do not know exactly what inorganic compounds were in the coal-forming plants nor what their percentage was. When trees like oak, beech and pine are burned, the ash is less than 1 per cent. Again, some of the living plants more closely related to the ancient coal-forming ones, as, for example, some of the living tree ferns, club mosses, and horsetails, leave ash ranging from 3 to 11 per cent. In fact, it is chiefly through a study of the present plants that we are able to arrive at conclusions regarding the composition of plants of the past.

Assuming, then, that coal-forming plants had an ash content from less than one per cent to over eleven per cent, how will this affect the "inherent ash" of coal-forming plants?

It seems clear that the "inherent ash" of coal-forming plants cannot be the same as the so-called "inherent ash" of the resulting coal. It is generally believed that coal was formed by the accumulation and alteration of vegetation in large swamps. This vegetation lost a portion of its organic components, and while this loss was taking place, some of the inorganic matter must have gone into solution in the swamp waters; how much, we have no way of knowing. Neither do we know what became of this inorganic matter. If it escaped through drainage, which is poor in swamps, a great deal was lost. If it did not escape it must have accumulated until it was precipitated from solution. During a later stage in the coal-forming process, this inorganic matter must have been further changed; just how much and in what direction, again we do not know. Coal analyses throw no light on the problem, for the ash given in them includes the mineral matter in the form of sediment laid down with the dying plants, minerals carried in solution in the waters which flowed into the swamp, and minerals deposited after the coal was formed, as well as the doubtful factor of inherent inorganic materials of the original plants.

Since we have no way of knowing how much of the coal ash represents materials occurring as constituents of the plants from which the coal was formed, the term "inherent ash" should either be dropped or given a definite meaning.

An alternative term is minimum ash and is defined as that portion of coal ash which is obtained from the inorganic matter that cannot be removed from coal without chemical alteration of the organic coal substances. The minimum ash for every coal could probably be determined by some standard method of fine grinding and flotation without destructive chemical treatment, and would indicate a limit of efficiency for the cleaning method employed.

Why Not MINE COAL *in Illinois*

By Retreating Longwall?

By Oscar Cartlidge

Consulting Engineer
Charleston, W. Va.

IN MY previous article, entitled "What Is The Matter With Illinois?" which appeared in the July issue of COAL AGE, pp. 409-410, I showed that Illinois could recover its status if the coal lessors would allow the operators to remove entirely all the coal instead of a part of it, if the state would liberalize its laws requiring the driving of frequent crosscuts, if yardage for narrow work which is no longer justified be abolished and only 5c. a ton extra paid for such work, and if the miner would cease to oppose the introduction of mechanical appliances for loading and conveying.

There still remains the necessity for planning a system of operation that will permit full benefit from these concessions when obtained. I submit what is, I believe, an entirely new mining layout, and one peculiarly fitted to Illinois conditions if the four changes just advocated can be put into effect. The plan is shown in Fig. 4, and in modifications of the same in Figs. 1, 2, and 3. It provides a greater length of working face in a given area than has hitherto been devised. Even with the coal faces set at a angle of 30 deg., as shown in Figs. 1 and 4, the actual pillar faces are 3,682 ft. long when the pillars are 100 ft. wide. Add to these pillar faces—32 in number—the necessary narrow places to maintain an average tonnage, and a total of over 8,100 tons is possible from each day's loading if the coal is 7 ft. thick and undercut to an equal depth. And this from only one cut a day in each place.

Two or three cuts from narrow places could easily be made with good loading machines, but that is not possible under laws which require that all blasting be done solely in shifts when only shotfirers are underground.

As this large output can be obtained from a relatively small territory, operating costs will be greatly reduced. Of course, most of the older mines are incapable of handling such tonnages, but it is possible for them to modify the plan to suit their conditions.

This system will simplify ventilation. Fresh aid traverses the haulageways and working faces and wastes out over the abandoned gob. Stoppings are few, and there are not many overcasts and doors to erect and maintain.

Haulage is reduced to the handling of cars *en masse,* which is the most effective method, and track has to be laid only in straight entries, with no room switches and with only an occasional crosscut switch to lay. Timbering is more expensive, but it is possible to recover cribs and props and use them over if proper attention is paid to this work. Collapsible props of the Lorain type should, and will, cause any Illinois roof to break when and where the engineer desires.

The proposed plan is shown in Fig. 4: From main entries, *Z* of which there may be two or more, cross-entries, *y,* are driven any convenient distance apart, and in the pos-

Fig. 1—Inclined Pillar Faces

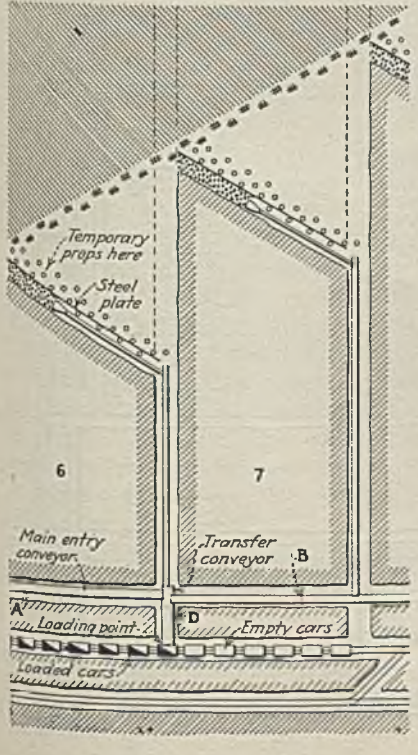


Fig. 2—Square Pillar Faces

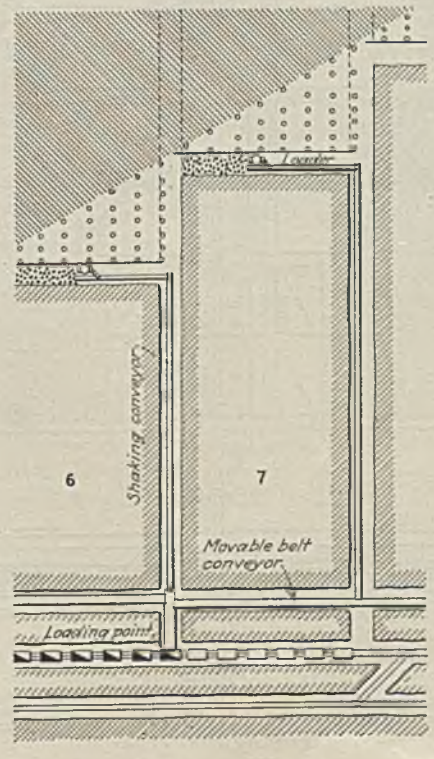
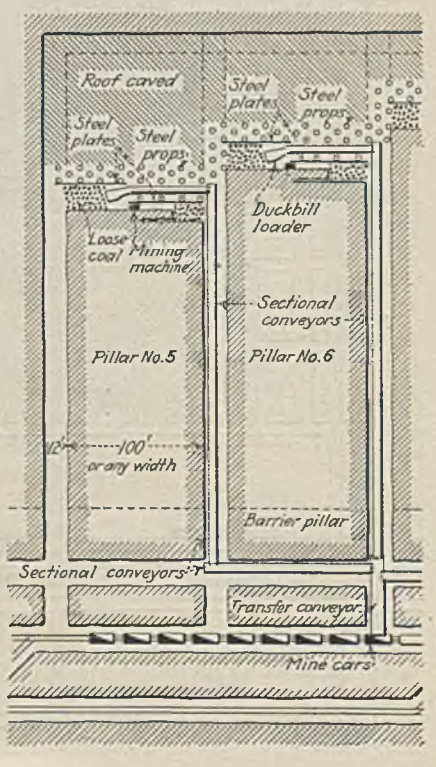


Fig. 3—Square Faces and Duckbills



ition and number as shown if the full member is to be operated. The drawing shows the inside entries 750 ft. apart from center to center for each panel. From these cross-entries, *y*, narrow places are driven at right angles with any chosen centers, the drawing showing them 112 ft. apart.

PARALLELING the crosscut entries, *y*, and exactly midway between the two inside ones, an entry, or pair of entries, is driven, *X*, from which long-pillar working faces 1, 2, 3, etc., are retreated in either direction at an angle best suited to local conditions. Each pillar preferably should be started a few feet behind the preceding one, forming thereby a continuously advancing wedge. It is to be noted that the coal from each pillar face is carried *inby*.

In practice the required number of narrow places should be driven through, the work proceeding in both directions from *y* and *X*, and when the required number have been connected a cut would be made from the inby corner of pillar No. 1. When that pillar has been retreated the right distance—about 35 ft., as shown—pillar No. 2 should be started in like manner, and this proceeding should continue until the full number of faces is obtained. The number of faces will, of course, depend on the line of roof break which had been previously determined to be the easiest to control

All conveyors, or track, if track is used instead of conveyors, are taken in the direction of solid coal, and workmen and equipment are protected from roof falls by always being within the triangular space inside the line of roof break.

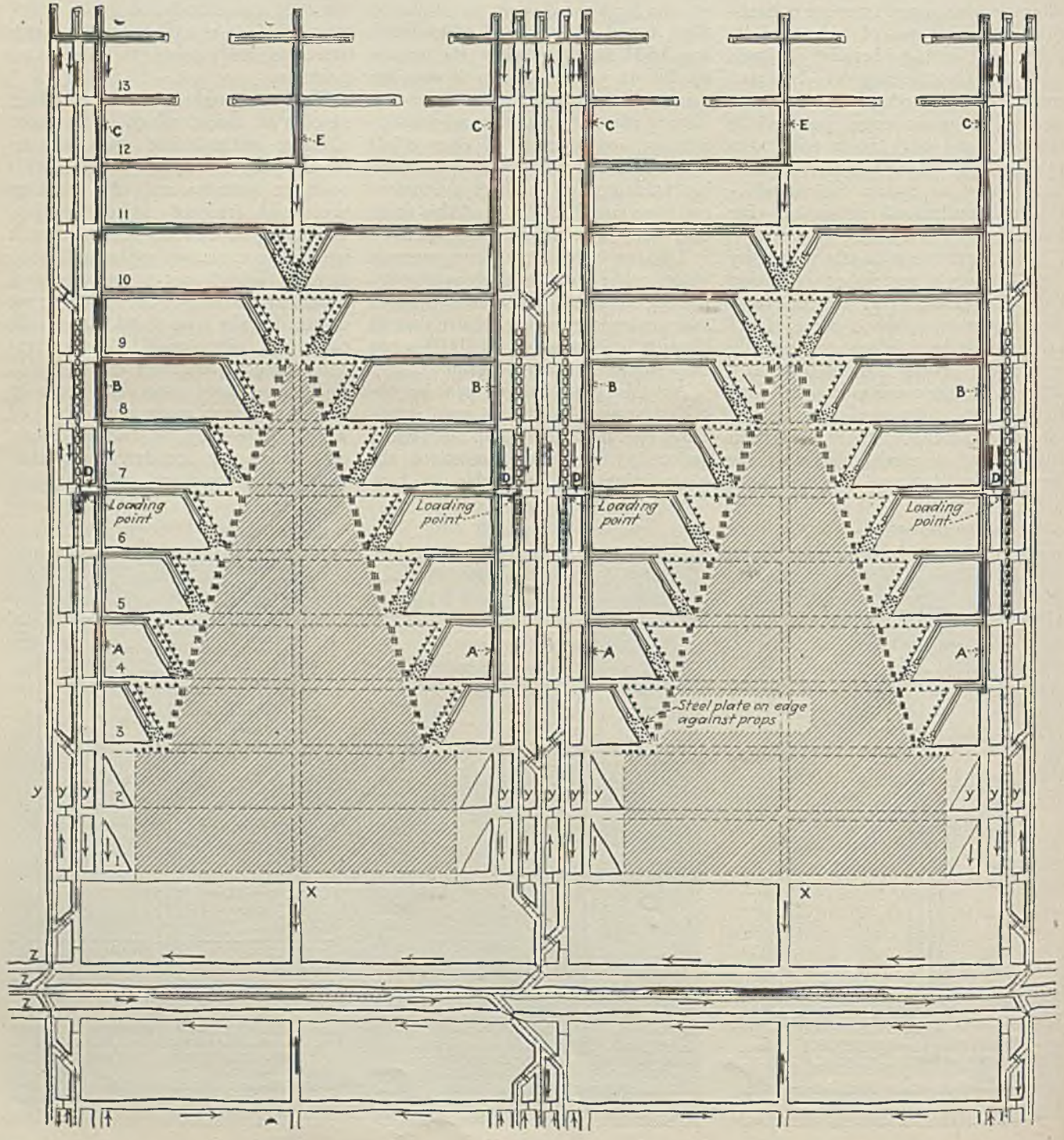


Fig. 4—All Coal Removed Mechanically

LIKE panels may be started from the main entries, *Z*, from time to time as necessity requires, and pillars supporting the cross-entries, *y*, will be recovered retreating when the wedge has advanced the limit, all track being taken up as the pillars are removed.

By driving the narrow intersections, or rooms, through before starting withdrawal, pillars 1 and 2 (or more) may be started together in both directions from *X* and carried back on an even line. This has the disadvantage that all of the equipment will have to be moved at the same time if conveyors are used for carrying the coal.

This system has these novel features: That the panel is split through the center by the entry *X*; that by wide pillars the coal is withdrawn inby from that entry, the retreat being in two directions at the same time; that the pillars are drawn on the retreat, preferably in wedge formation, the angle chosen being that best suited to conditions; that the workmen and equipment are at all times on the escape side of the break line; that the combination of continuous advance with wide retreating pillars with faces at an angle gives the maximum tonnage that can be obtained from any given panel width.

THE panels are ventilated in the ordinary way, the air going up the middle cross-entry, *y*, and returning on the two entries on either side, so as to permit the conveyors to operate through crosscuts without interference from stoppings. Where narrow places are driven beyond the limit allowed for crosscuts, auxiliary fans and flexible tubing are used to force air to the faces.

Fig. 1 shows the arrangement in detail at the loading point between pillars 6 and 7 when conveyors are used to transport the coal to the mine cars. Conveyors *A* may be of the belt type, each 340 ft. long for the plan as shown and preferably should be of rigid consruction with the frame mounted on wheels or rollers so that the conveyors can be pulled forward by a motor or winch whenever a pillar face is finished. The same applies to conveyors *B*, except that they are 100 ft. longer.

As each pillar in turn is finished the conveyors *A* and *B* are moved forward one pillar and the transfer conveyors *D* are moved with them, making a new loading point each time, the process being repeated as long as the wedge advances.

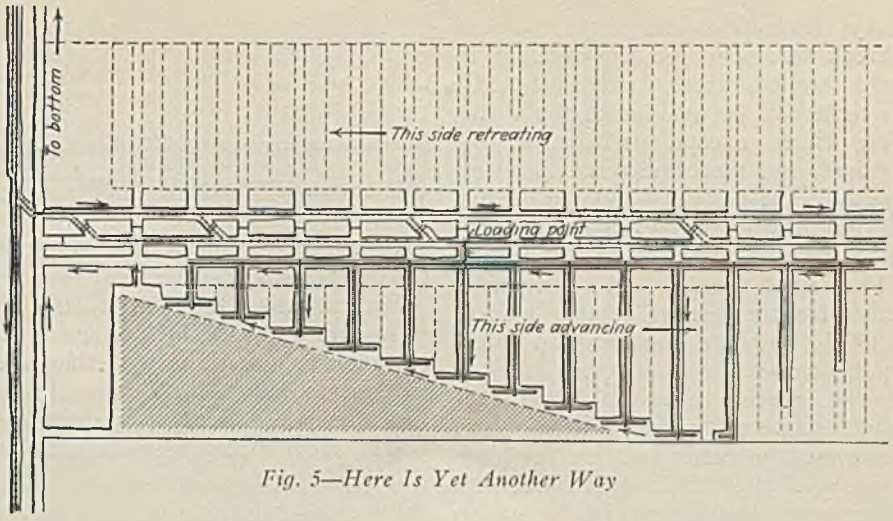


Fig. 5—Here Is Yet Another Way

CONVEYOR *D* must have double the carrying capacity of *A* and *B* and should be constructed in movable sections, as it must be moved and re-erected in crosscuts about every 40 days if the pillars are 280 ft. long, as indicated. All other conveyors may be of the shaker type, of suitable capacity for the work to be done. Fig. 2 is like Fig. 1 except that the pillar faces are shown at right angles to the rooms.

Fig. 3 shows three pillars retreating together; cutting, shooting, loading and timbering, each being performed at the same time. Fig. 5 shows how the work may be advanced on one side and the other side brought back retreating, at which time the pillars and barriers would be recovered also.

Fig. 6 is an idealized scheme for room-and-pillar work where shooting and loading can be done on the same shift. It is then possible to take more than one cut out of narrow places and perhaps in rooms also. Rooms are turned off cross-entries and driven the full width of cut that can be made by a circle-cutting machine, the cut being at the bottom or any other place in the seam most suitable. In other cases the coal may be undercut by shortwell machines. Wide pillars are left between rooms, which are extracted as rapidly as the work advances.

SHORT conveyors transport the coal to the cars. These, which are 70 to 80 ft. long, are designed to be of a length that will load four or five cars at one spotting. They extend alongside the track and are supported between the first and second rows of props on the crosscut side and have side deflectors at the unloading ends. Those shown in the drawing are of the shaking type with Duckbill loaders attached, but other types of conveyors and other loaders also can be used to handle the coal.

Fig. 7 is a room section showing the conveyor ready to begin loading into the cars. I indicate the location of portable electrically driven air compressors which are intended to furnish the compressed air needed at the working faces for actuating the conveyors. Air motors are much cheaper in first cost than electric motors intended for the same purpose.

It may be, however, that it would require too large a machine for practical purposes, in which case the line could be broken up into more units, or, if that is not practicable, electric drives could be provided instead. As the compressors would be moved inby at stated intervals—every 580 ft. as shown—and on the mine tracks, wheels should be provided for the machines so that they could be transferred easily and quickly.

THE ventilating current travels up the two right-hand entries and returns through the two at the left. This arrangement does away with all stoppings and only an occasional door, for crosscuts are not required between the middle entries except for haulage.

If four tracks are maintained the two inner ones will serve ideally as places in which gathering locomotives can store loads. The track in the two outer entries may be taken up behind the compressors as the work progresses.

Referring again to Fig. 4, it is apparent that only one wedge may be operated, but if two are advanced at the same time there should be five cross-entries *y* in the center and three on the sides.

Cribs or steel props may be used for breaking the roof, and intermediate timbering will be done as neces-

sity demands. The angle of roof break being in peculiar relation to the angled faces, excessive roof weight will be avoided at the working faces, except, perhaps, at the points, and therefore power loaders, such as the Goodman, should be able to work with safety, especially if a thin strip of coal is left at the points. The angled faces should be favorable also for the use of scraper loaders and for loaders operating on caterpillar treads.

To prevent the coal from being scattered when blasted, and to hold it in better position for loading, steel plates in lengths convenient for easy handling should be set on edge against the inside row of props before the coal is shot down.

By indicating the use of shaking conveyors and Duckbill loaders I do not intend to indicate that they are superior to others, for I do not know that they are. Scraper loaders and power shovels might do as well or better, and in some cases the mine track might be laid alongside the face and the coal be hand-loaded with advantage.

Fig. 7—Feeding a Long Line of Cars

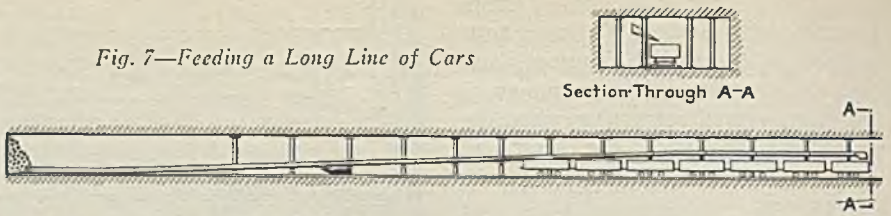


Fig. 6—With Turret Cutters and Duckbills

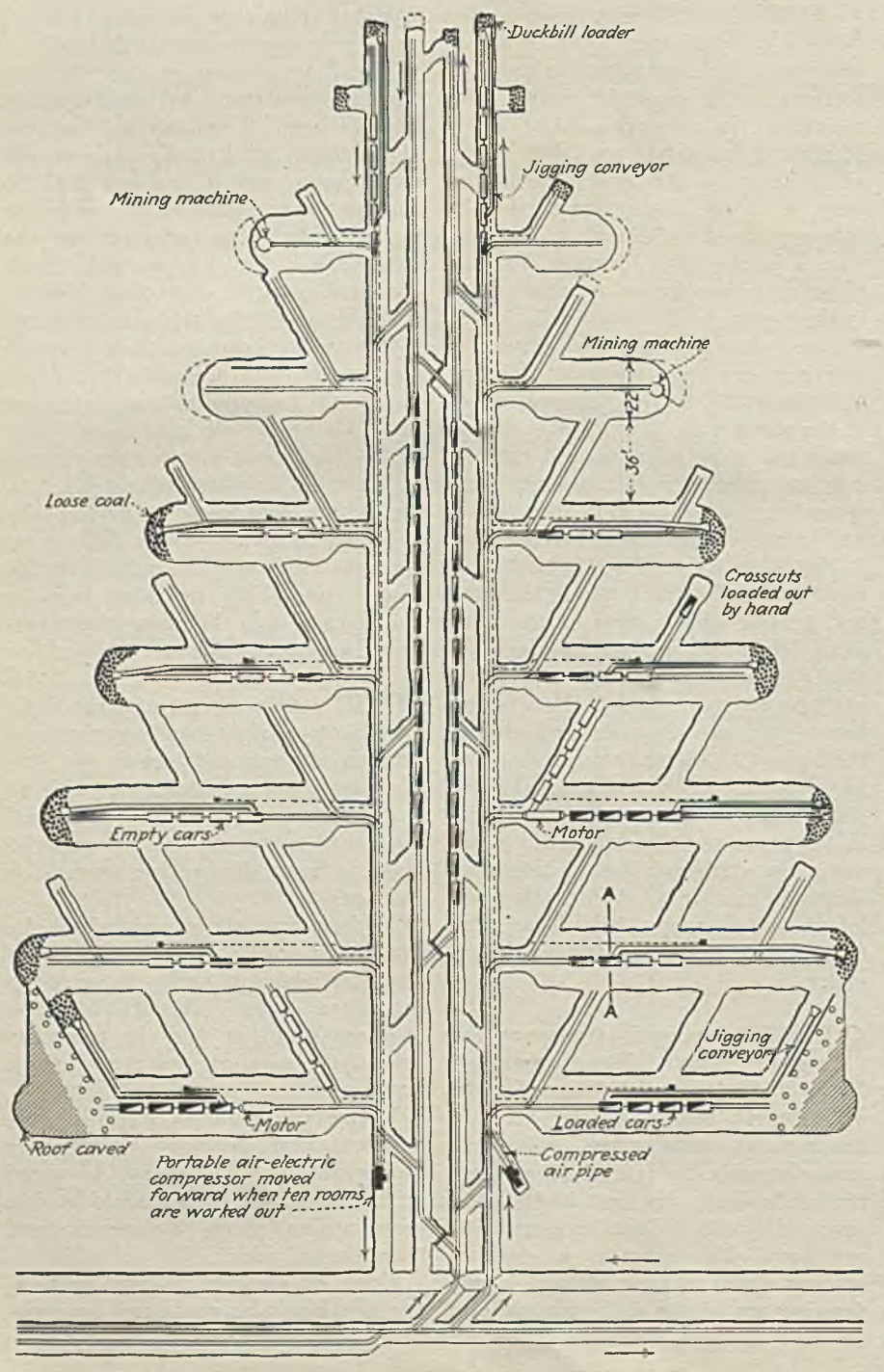


Table 1—Equipment Required for Mechanization

4	transfer conveyors *D*, each 50 ft. long	$15,000
4	entry conveyors *A*, each 350 ft. long	68,000
4	entry conveyors *B*, each 450 ft. long	90,000
2	large shaking conveyors *C*, each 300 ft. long	6,500
2	large shaking conveyors *E*, each 200 ft. long	5,800
13	light shaking conveyors, each 100 ft. long with duckbill leaders attached, for entry work	37,500
16	light shaking conveyors, each 150 ft. long with duckbill loaders attached, for narrow work	49,300
34	room conveyors, average length 190 ft.	80,600
32	face conveyors, each 120 ft. long with duckbill loaders attached	92,800
1,000	mine cars, 4-ton capacity	250,000
23	mining machines	85,000
16	gathering locomotives	90,000
6	main-line locomotives	50,000
30	blower fans with flexible tubing	10,000
25	portable electric drills	9,000
12	doors, material for	5,000
3	overcasts, material for	6,000
16,000	ft. mine-track material	12,000
150	stoppings, material for	40,000
40,000	ft. insulated copper wire	3,500
15,000	ft. trolley wire	2,500
	Bonds, hangers, etc.	2,000
		$1,012,500

All mining, shooting, conveyor moving, etc., with a fully mechanized layout, should be done on the night shift, except that loaders and other daymen should assist in moving equipment and in timbering roof during their spare time. All loading, conveying, hauling, etc., should be done on the day shift, and each place must be cleaned up and ready for the night crews, which crews must also have each place ready and the coal shot down for the next day's loading. Shooting will have to be done on third shift wherever the laws require that everyone except the shotfirers be outside when coal is shot.

Assuming that we have a layout such as is depicted by Fig. 4 and that an agreement had been made between operators and miners to cooperate in handling mechanical equip-

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Standard Equipment Slightly Modified Interlocks 4½-Mile Conveyor

By F. R. Grant

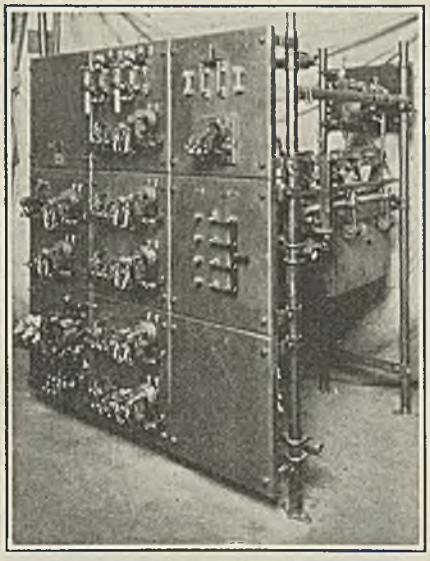
Industrial Engineering Department, General Electric Co.

IN 1923 the H. C. Frick Coke Co., after extensive study and investigation, undertook the installation of what probably is the longest belt-conveyor system in the world. This installation, known as the Colonial Dock conveyor, carries coal from the mine through an underground tunnel to a loading dock on the Monongahela River, a distance of 22,930 ft. The system was designed to transport 1,220 tons of coal per hour and consists of nineteen sections of 48-in. belt running at 500 ft. per minute and one section of 60-in. belt operating at 350 ft. per minute. The sections vary in length from 321 to 1,513 ft.

The electrical equipment consists of twenty wound-rotor type induction motors varying from 50 to 175 hp. and twenty automatic starting and control equipments. The motors are of practically standard construction, so the chief problem was in laying out a control equipment that would fulfill the operating requirements and be sufficiently sturdy to withstand continuous operation without undue attention and upkeep.

It was at once apparent that the chief feature of the control was to be a system of interlocking that would insure the proper sequence in starting and give adequate protection while running, to prevent the delivery of coal to a stopped section.

From a manufacturing standpoint



Starting Panel for One Section of Colonial Conveyor

it was advisable, of course, to have the control equipment as nearly standard as possible, and from an operating and maintenance standpoint to keep it as simple as possible.

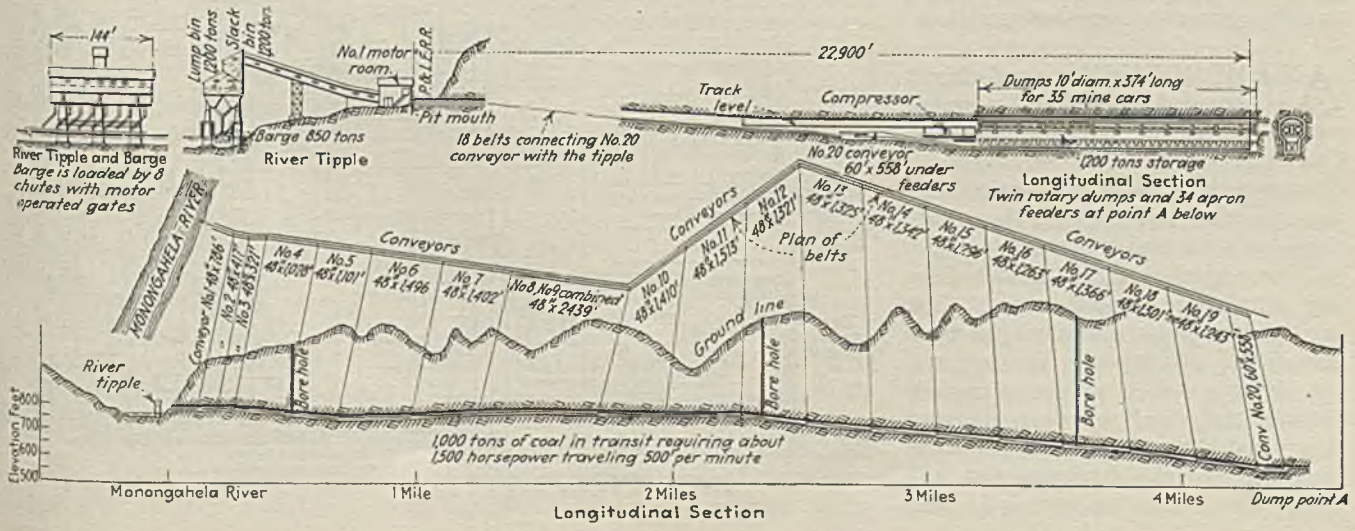
After careful consideration, a control system was laid out consisting of twenty combination primary and secondary control panels and one master-control panel, together with the necessary rheostats, control transformers and limit switches. Each of the control panels contains a suitable oil-immersed primary contactor, the necessary secondary accelerating contactors, a solenoid brake contactor, control switches, control contactor and time-limit and current-limit relays.

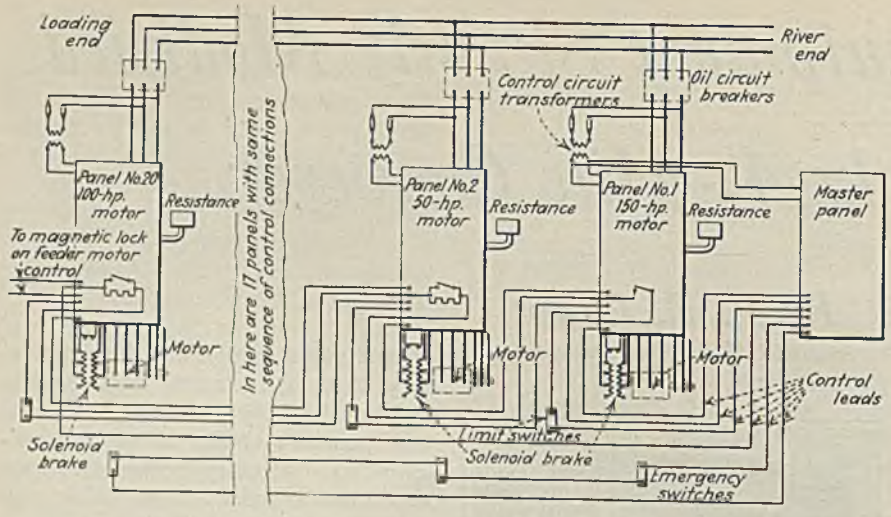
IN STARTING, the rotor resistance is cut out by the accelerating contactors, whose operation is controlled by a combination of time-limit and current-limit relays. The first two steps of resistance are of sufficient value to give comparatively low torque on the motor, thus allowing it to take up any slack in the belt and backlash in the gears without excessive shock. These two points are actuated by time-limit relays, after which the motor is accelerated to full speed by current-limit control.

The master control panel is located at the delivery end of the conveyor and contains the necessary devices to give complete control of the entire twenty sections. The equipment on this panel consists of a double-pole control switch, a voltmeter arranged to indicate the starting of each conveyor section, a start-stop push-button station, an undervoltage protective and control contactor, and a contactor for emergency shut-down.

The general scheme of control is as

Plan and Profile of Colonial Conveying System





Interlocking Connections Between Starters of Colonial Conveyors

follows: The various sections of conveyor must start in sequence beginning with the delivery end of the system. In case of shut-down in regular service or because of loss of power, all motors will be de-energized simultaneously. In case of trouble with any one conveyor or motor which causes a shut-down of that particular section, all conveyors between that section and the feed end will be simultaneously shut down, thus preventing coal being piled up on the conveyor section that is stopped.

The sequence of starting operations is as follows: The operator depresses the start button on the master control panel. This energizes the undervoltage and emergency control contactors, which close and in turn energize the control contactor on motor control panel No. 1, which closes and energizes the primary contactor, after which the starting operation is completed by means of the time-limit and current-limit relays as heretofore explained. When the last accelerating contactor on control panel No. 1 closes, it energizes the control contactor on panel No. 2, and this sequence is repeated until all twenty equipments are in operation.

AN EMERGENCY control circuit is provided with a hand-operated switch located at each motor station. Opening any of these switches de-energizes the emergency control contactor on the master panel, thus shutting down the entire system.

Limit switches located at each driving station are actuated by a "belt slip" device and are so arranged that, should the slip between the belt and the driving pulley exceed a certain amount, the switch will open and shut down that conveyor and all those between it and the feed end but will allow the others to run and clear themselves of coal. Provision is made so that any motor in the sequence can be operated independently for testing or adjustment.

Solenoid brakes were supplied for all motors, but it has been found in practice that they are required on only a few sections and accordingly have been disconnected on all sections where not needed. This system was put into service in 1924 and has been in use ever since with practically no troubles from the electrical equipment. The system as a whole has proved to be a very efficient and economical means of transporting coal over comparatively long distances.

As a result of the experience gained with the Colonial Dock conveying equipment, the H. C. Frick Co. in 1927 decided to install a similar equipment approximately 2½ miles long at its Palmer Dock. This installation consists of twelve conveyor belts, eleven of which operate in series to carry coal from the main 30-car dump to the tipple on the river bank, while the twelfth brings coal from the Palmer two-car dump and feeds the main conveyor at the fifth section.

THE first five sections consist of 60-in belt, the next six sections of 48-in. belt and the twelfth of 42-in. belt. The sections vary in length from 339 to 2,217 ft. and were designed to deliver 1,800 tons of coal per hour, 1,400 of which will come from the main dump and 400 from the Palmer dump.

The power equipment consists of three 300-hp., three 200-hp., four 175-hp., one 125-hp. and one 75-hp. 3-phase 60-cycle wound-rotor type induction motors with switchboards and control.

The control equipment in general is similar to that at the Colonial Dock; the only changes were those made necessary by the particular problems not encountered in the previous installation and the use of types of control equipment which have been developed since that time.

The principal change in the control was the use of time-limit relays exclusively for acceleration instead of a combination of time-limit and current-limit relays. The chief difference in operating conditions is that the first three sections of the conveyor operate on a very steep grade, making it necessary to provide brakes to keep the belts from running backward if power should fail or if the system should be shut down with coal on the belts. It also was necessary to

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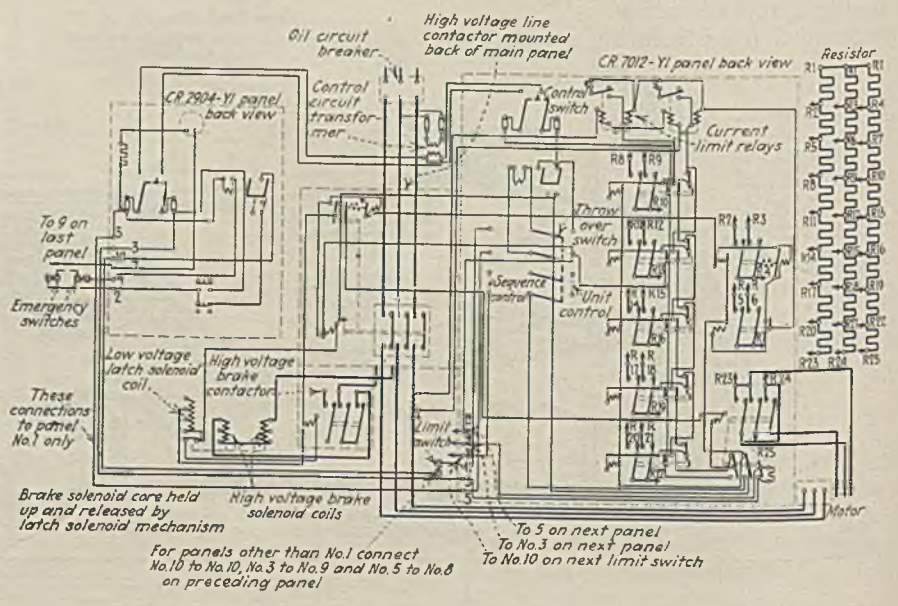
One of the Twenty Starting Equipments



Can Labor Assist Management?

Pitfalls and Peaks of Employee Representation

By Edward S. Cowdrick

Industrial Relations Counselor

AROUND a table in an office of a big coal company 25 or 30 men sat in conference. About half of them were miners; the rest were superintendents and other officials—but you could not readily tell one class from the other. They were not lined up on opposite sides of the table but mingled indiscriminately. The meeting was informal but business-like. Questions, explanations, complaints and decisions followed each other in orderly fashion.

In the course of the session a report was made by a joint committee of miners and officials appointed to adjust a question related to rents charged for company houses. This question had come up at a previous meeting, when the management had announced that the company was losing money on its investment in houses and would have to raise the rent $1 a room. The miners had protested and the appointment of the committee had been the result. It was this committee which reported its findings to the group of miners and executives around the table.

An agreement, the report said, had been reached. The company had convinced the employees that it was losing money on rents, but the management had accepted a compromise proposition to scale down the increase from $1 to 50c. a room. Moreover, the company had agreed to postpone for some months the date upon which the increase would be effective. The committee's report was accepted and the question was closed.

SHIFT the scene to a mining district distant from the one in which the above episode took place. Here there had been a long-standing request for a mantrip to carry the diggers to their working places. The management had hesitated to grant the request, partly on account of safety factors involved. At length the question was submitted to a joint committee.

This committee called a mass meeting, which was attended by the miners in the camp, by a number of company officials, and by representatives of the state coal mine inspector's office. The meeting lasted two hours. When it broke up an agreement had been reached and ratified by vote of the men concerned, under which the mantrip was authorized and a list of regulations for its use, most of them bearing upon safety, was drawn up. Soon afterward the mantrip was in operation.

Edward S. Cowdrick

A graduate of the University of Kansas, Mr. Cowdrick has had long experience in dealing with the problems upon which he writes. He gained first-hand information on the Rockefeller plan as assistant to the president of the Colorado Fuel & Iron Co.—the company where that plan had its introduction in industrial relations in the United States. During the past five years Mr. Cowdrick has been employed as counselor in industrial relations by a group of companies in the East and the Middle West. He is the author of two books and a number of magazine articles on industrial subjects and is a member of the Society of Industrial Engineers, the American Economic Association and the American Management Association.

Unusual? Not at all. Incidents like those related are matters of ordinary routine in companies in which joint relationships of men and management are handled through employee representation. The two illustrations given happen to be drawn from the mining industry. Scores of similar cases could be taken from the experience of companies in steel, oil, rubber, transportation, machinery—any one of a long list of industries in which forward-looking employers have learned that co-operation and mutual understanding, with definite machinery for dealing between workers and management, help mightily in the administration of labor.

Employee representation first attracted wide attention when the "Rockefeller plan" was adopted in 1915 in the coal mines of the Colorado Fuel & Iron Co. For the next year or two its spread was slow and apparently it found scant favor in the ranks of either labor or capital. During the feverish years from 1917 to 1920 representation gained ground rapidly—sometimes adopted as a result of genuine conviction of its permanent value, sometimes taken on hastily by employers who snatched desperately at anything that gave hope of solving labor problems.

THE depression of 1920-1922 brought the abandonment of some plans by employers who no longer saw the "need" for them. A few other plans were swept away in the urge for economy, which caused all personnel policies to be sharply scrutinized and sometimes wisely, sometimes unwisely, pruned. In the main, however, representation stood up well against the buffeting of the deflation period, and since then it has been

making steady, if gradual, growth. In 1926 the National Industrial Conference Board received reports from 431 companies having representation plans covering 1,347,000 employees.

The term "employee representation" is applied to any one of a number of rather widely differing systems in which matters of mutual concern to management and labor are handled by direct negotiation between officials and representatives elected by employees from among their own number. Structural variations are so wide and so numerous that classification is difficult. In general, however, most of the existing plans fall into two groups:

(1) The governmental, or Leitch, type, in which employees and officials are organized in imitation of the federal government, with a senate, a house of representatives, and sometimes a cabinet; or

(2) The works-council type, in which the governmental machinery is omitted and employees and management deal together mainly through joint conference and joint committees.

DIFFERENCES in function and authority are as wide as differences in structure. Some works councils are scarcely more than debating committees with dimly outlined privileges of petitioning and advising the management. Others are militant bodies with broad powers of coercion and with the right to force arbitration in the event of disagreement. Between these extremes are found all shades of variation, reflecting different local conditions and different labor philosophies.

Sometimes management retains the right of final decision, with the last appeal to the works manager, the president or the board of directors. Other plans provide for an appeal outside the company, sometimes to a public officer or commission. Sometimes provisions are made for voluntary arbitration, and in a few plans compulsory and automatic arbitration is prescribed. In some other companies the question of final authority is left open and undetermined, on the theory that if the machinery of joint agreement breaks down management and employees should be left free to take whatever measures they would have taken if there had been no representation plan at all.

While employee representation is not necessarily, or even usually, anti-union and while in some plants a representation plan and a union contract function side by side, the representation movement has been mainly in unorganized or open-shop industries and has been independent of trade unionism. Perhaps this is in part because it was in these industries that the need of some method of collective dealing was most keenly felt, while at the same time the sharp lines of division between management and labor sometimes created by unionism did not exist.

IN SOME companies management and men have seen the possibilities of constructive co-operation latent in the representation principle and have pooled their experience and their knowledge for the solution of problems in the fields of safety, efficiency, economy, elimination of waste and the many other elements entering into production management. Sometimes noteworthy results have been achieved.

There has grown up, however, a form of collective dealing in some ways closely resembling employee representation, which is directly associated with trade unionism. This is known as union-management co-operation. It is exemplified in the Baltimore & Ohio plan, adopted in 1923, and later extended to several other railroads. Under union-management co-operation unions are fully recognized and grievances and other causes of controversy are handled through the regular union machinery, under contracts between the employing company and the national or international organizations involved.

Upon this union machinery of adjustment there are superimposed systems of joint committees and conferences for the transmission of information and opinions, for the comparing of views, and for the interchange of ideas and suggestions along lines of economy, efficiency and good management. The unions, in exchange for the recognition accorded by the company, agree to use their best efforts to aid management in solving the problems of the industry.

IT WILL readily be seen that in many respects employee representation and union-management co-operation are similar and that the outstanding point of difference is that the latter is an adjunct of trade unionism while the former is independent of it. The choice between them, so far as it concerns the individual company, depends mainly upon whether or not the employer has trade-union agreements or wishes to make them.

In most companies that have adopted employee representation the first visible results have been floods of grievances, complaints and petitions. Usually multitudes of old sore spots have been uncovered. Legitimate causes of complaint, long neglected by officials, have been dragged into council rooms, there to be wrangled over by workers and managers unskilled in the methods of orderly adjustment. Demands, often unreasonable, have been made by employee representatives knowing little of the problems of limitations of management.

Usually this stage soon passes. Grievances are adjusted, standards of management and supervision are toned up, and workers and officials both learn something of each other's problems and points of view. Gradually, if the representation plan is administered fairly and wisely, there comes improvement in loyalty and morale and gain in good fellowship and sympathy between management and employees.

BUT with the passing of the grievance stage there comes a critical time in the development of the representation plan. Some employers have reported, in effect, that "all the complaints were taken care of, there was nothing left to do; the meetings lost interest and so the representation plan was abandoned."

Probably few works councils actually have been given up as a result of failure to keep up interest after the preliminary grievance stage has been passed. In many more cases, however, there has been a slackening of effort, a loss of vitality and a growing tendency on the part of both management and workers to administer the plan perfunctorily and as a matter of routine, with little conception of the undeveloped resources which lie just beyond.

Along the lines of constructive co-operation unquestionably lie the greatest possibilities for the future development of the representation movement. Gradually a new conception of the works council is forming in the minds of industrial managers. At first looked upon mainly as a machinery for adjustment and a means of protecting employees from the occasional tyranny of foremen and other officials, the system is slowly but steadily making its way toward recognition as an important tool of management in the operation of industry.

This does not mean that funda-

mental ideas of fair dealing have been abandoned. Representation still functions for the adjustment of grievances and for negotiation on controversial points. It has been found, however, that with good labor administration the attention needed for these activities is gradually reduced, while at the same time the functions of the works council have been broadened and its capacity for usefulness increased. Many managers, including some who at first opposed representation, now declare that they would find it difficult to operate their plants under any other system.

Along with this enlarged conception of the functions and usefulness of employee representation there has come a closer connection between the works-council machinery and the operating line organization. This is noteworthy particularly in the case of foremen. In the early days of the representation movement many companies introduced council plans without taking the trouble to explain to the foremen what it was all about. Worse still, managements sometimes encouraged employees to bring complaints to conferences or committees or to higher officials instead of taking them up through the regular channels.

In most companies these tactical blunders, natural enough in pioneer experiments with a novel system of labor administration, have long since been corrected. Foremen have been made acquainted with the labor policies of the management and have learned that these policies do not constitute infringements upon their own authority. Many formerly antagonistic or indifferent foremen now look upon representation as a genuine aid in their work and upon employee representatives as their most valuable allies. It is to be expected that these advances in technique and in understanding will continue and that employee representation will become ever more firmly established in the management of American industry.

FOR the employer considering the adoption of some form of the labor-management co-operation a few practical suggestions may be useful:

(1) Employee representation and union-management co-operation are not necessarily antagonistic. Either system has possibilities of usefulness and the choice depends mainly upon conditions in your company, particularly as concerns the presence or absence of union agreements.

(2) Do not fool with either employee representation or union-management co-operation if you are trying to put something over on your employees. Neither system is adapted to this purpose. Unless you really want to play fair, stick to the old methods; they are safer for your type of employer.

(3) Try to understand your labor situation before you start. Know what your employees are thinking about and how they feel toward the management. Then select a suitable time to initiate your new labor policy. A suitable time is not the day before a strike is to be called.

(4) It is a good idea to have the co-operation of the employees themselves in drawing up and adopting a representation plan, but this is not essential and it is not always practicable. In any event, make sure that employees and foremen understand the plan before it goes into effect.

(5) Do not expect any system of employee-management co-operation to run itself. It will need the active and continued interest and support of the management.

(6) Watch for the time when the initial flood of grievances slows down and the council meetings are beginning to lose interest. That is the time to turn the representation plan into new channels of constructive co-operation. If the management fails to do this it is overlooking the most useful possibilities of its representation plan.

(7) Do not expect your employees to co-operate for the advantage of the company unless they are given facts about the company's affairs. Pleas for economy are likely to fall on deaf ears so long as costs and earnings continue to be sacred mysteries. Do not go before your employees with mere platitudes and flag waving. Many an employer imagines he is fooling his wage earners when he is fooling only himself.

(8) A representation plan should be a part of a labor policy, not the whole of it. It should fit into the whole scheme of dealings between employees and management. It is futile to expect to cover up other delinquencies by a seemingly liberal works-council arrangement. Particularly is it hopeless to attempt to make any form of collective dealing take the place of fair wage rates.

(9) Employee representation is not a substitute for good judgement. Under whatever form of employer-employee relationships, successful operation will continue to depend upon the ability and character of the men in responsible positions. If the labor situation in your plant is bad, perhaps you need a representation plan—or perhaps you need a new superintendent.

Standard Equipment Slightly Modified Interlocks 4½-Mile Conveyor

(Continued from page 478)

provide these three belts with flywheels to insure their drifting, after failure of power, an amount equal to that of the other belts which are more nearly on the level.

In addition it was necessary to make provision for preventing the solenoid brakes of the first three drives from setting immediately on failure of power, but allow them to set when the belts come to rest. This was accomplished by equipping the brakes with a latch held in by a direct-current coil. This coil is excited from a small flywheel motor-generator set which has sufficient stored energy to maintain the direct current at a voltage value that will hold in the latch until the conveyor system has drifted to rest. The latch is then de-energized by a time-limit relay which was adjusted to the proper time value after the equipment was installed.

A 1,000-kva. synchronous condenser was installed at the substation which supplies this conveying system. This will give sufficient corrective effect to hold the power factor of the entire conveyor load at approximately 95 per cent.

At the time this article is written five sections of the Palmer Dock conveyor have been put into operation and the control equipment has functioned successfully. There is no reason to believe that the entire installation will not be equally as successful as the Colonial Dock conveyor.

The most interesting and important features of these controls, aside from the magnitude of each installation as a whole, are the ease with which various control units can be interlocked to give a definite sequence of starting and the required protection while running, and the fact that practically standard equipment was used throughout.

All Equipment

New and Completely Standardized At Indiana Strip Mine

By C. C. Balzer
Superintendent
Electric Shovel Coal Corporation
Clinton, Ind.

AS COMPARED to an underground mine much less time is required to develop a strip mine and bring it to full production. The use of shovels of increasing size and driven by electricity has speeded and cheapened the handling of material to such a point as to cause much activity in strip mining during the last several years.

Four miles northwest of Clinton, Ind., the Electric Shovel Coal Corporation operates a new strip mine equipped with the most modern machinery available and which in 1927 shipped over half a million tons even though the tipple was not completed until the last of January of that year. The investment in equipment alone is over a million dollars.

The property contains about 1,200 acres, all underlaid with strip coal. The seam, classified by geologists as No. 7 but known locally as No. 6, is made up of 52 in. of low-ash coal and 20 in. of top coal which contains over 20 per cent ash. The maximum cover is 52 ft. and the average 40 ft. This overburden consists of shale, clay and soil, and requires no shooting. The top coal usually is removed and wasted by the stripping shovel; at times when there is a market it is loaded separately and shipped.

When the development was planned, twelve years was assumed as the life of the mine. Already over 120 acres has been stripped. Two pits hauling to a common tipple and containing duplicate loading and stripping shovels are in operation.

The stripping shovels are Marion type 350, caterpillar mounted and equipped with 8-yd. dippers. The 90-ft. booms are a special wide-spread, rolling type; the dipper handles are the standard 60-ft. length. Power is supplied to the shovel through a 4,600-volt size No. 2 B. & S. three-conductor rubber-sheath cable. Each conductor is surrounded by a flexible copper ground sheath that is insulated therefrom. Direct current for the hoist, swing and crowd motors of the shovel is supplied by individual generators directly driven by a synchronous motor. Ward-Leonard control is used.

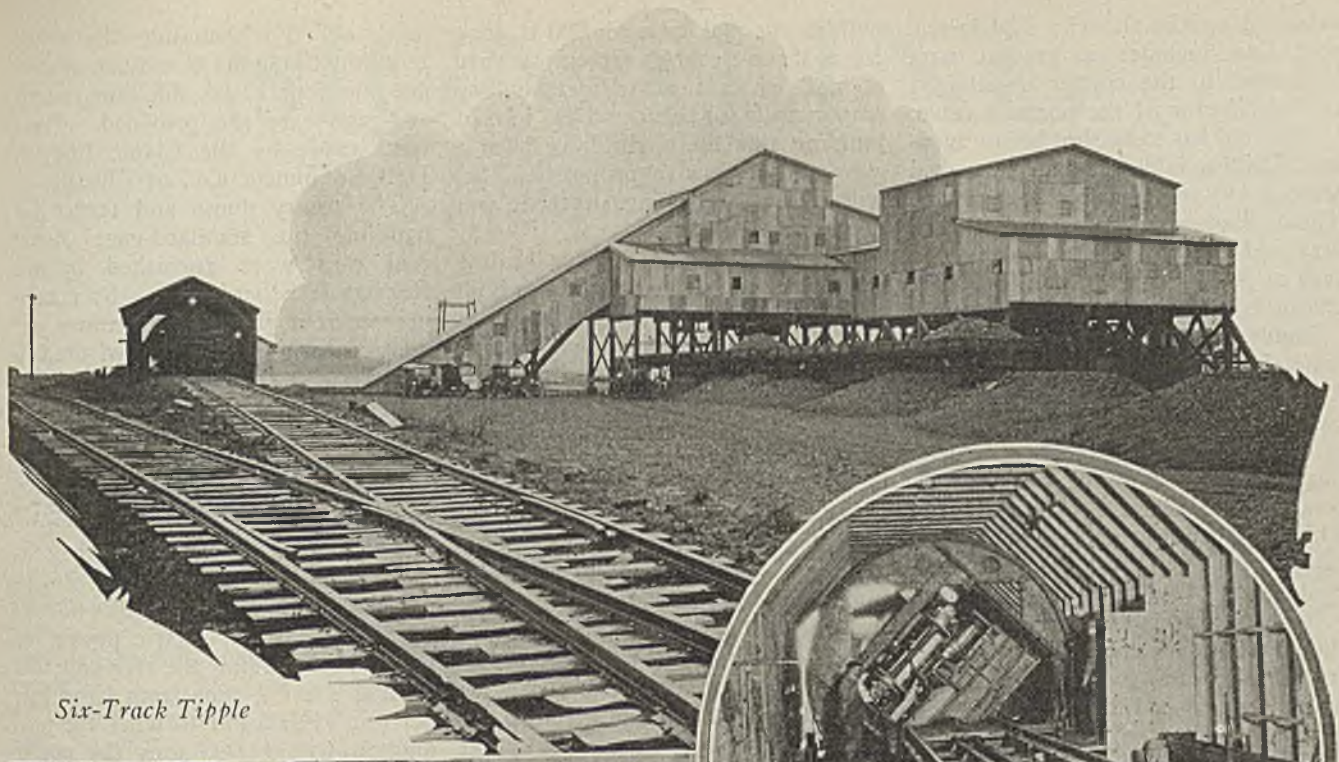
In each pit the coal-loading shovel follows within a few hundred feet of the stripper and gets its power at 440 volts through transformers mounted on the latter machine. These coal loaders are the Marion type 37 with caterpillar treads and 2-yd. dippers. An induction motor generator mounted on the shovel changes the energy to direct current, which is utilized through rheostatic controls.

As is shown by the accompanying sketches, the loading shovel takes a face of coal 35 ft. wide and leaves a 35-ft. coal berm. This considerable width which is left allows the haulage track to be 25 ft. or so from the high wall and therefore fairly well protected from slides and caves. Another advantage of the 35-ft. coal berm is that the stripping shovel can be taken back, without digging its way, to clean up a slide of the high wall should one occur.

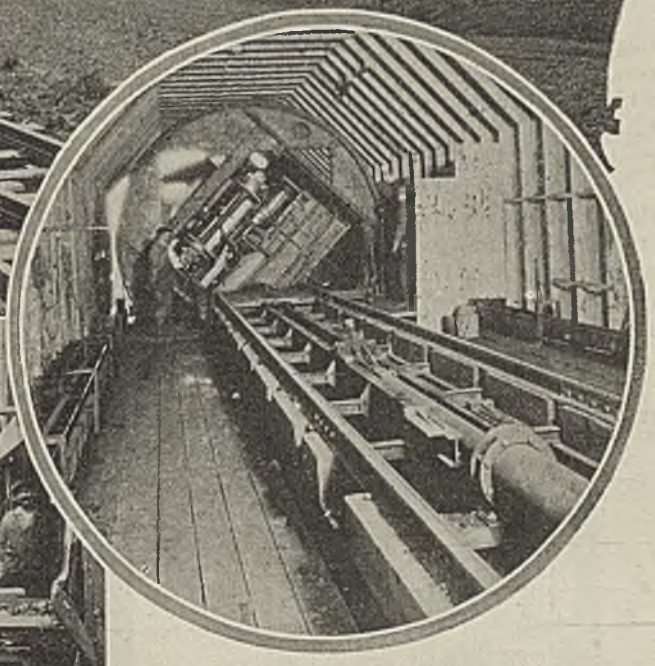
The system is to work back and forth the full length of a pit, taking a 35-ft. swath each way. When working in the direction away from the entrance of the pit the haulage track is taken up just ahead of the stripper and relaid just back of it in a position 35 ft. from the edge of the coal berm.

When digging back toward the entrance of the pit the relative positions of the haulage track and shovels are different. When moving in this direction the track is skidded over back of the stripper, without opening the joints, as the stripper advances. This is done by a track-moving machine which rides on the track and lifts and pushes the track and itself over by action of rams that are forced down at an angle against the ground.

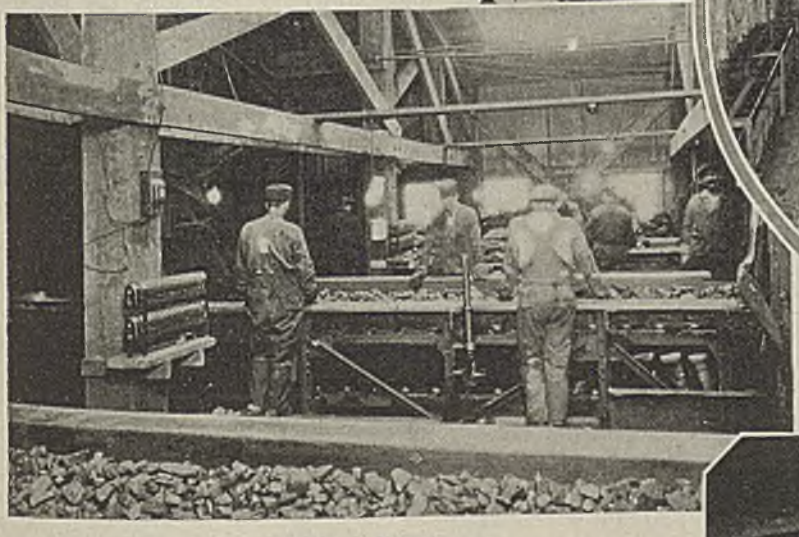
One of the mining pits is 3,000 ft. long and the other 9,000 ft. Running in a direction parallel to each pit but some distance away there is a 4,600-volt pole line. Lateral lines connected thereto and spaced 1,000 ft. apart extend to the pit. These laterals are shortened one pole at a time as the stripping face or high wall advances sidewise. The 2½-in diameter portable rubber cable which connects the stripping shovel to the nearest lateral is 750 ft. long. Any surplus is coiled on a manually operated reel



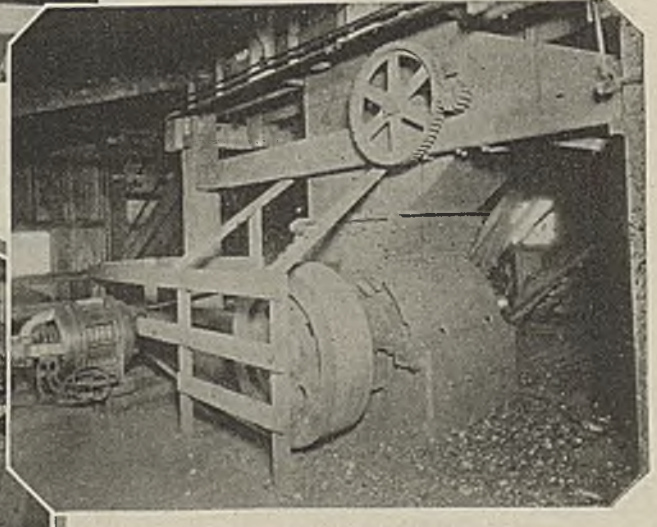
Six-Track Tipple



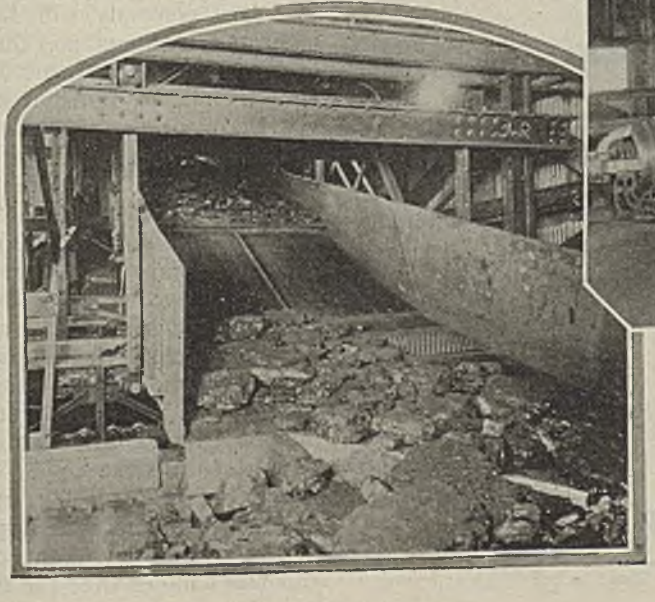
Car Spotter and Dump



Picking Tables



Refuse Crusher



Shaker Screen

mounted on the shovel. The lateral pole line includes a ground wire connected to the copper sheaths of each conductor of the portable cable.

The coal has to be shot before loading. Drilling is done by air furnished from a 440-volt portable compressor. The drillhole spacing is 6 to 8 ft. each way and the charge per hole is one pint of King FF black powder. The charge is ignited with a sulphur squib.

Haulage equipment consists of four Heisler 42-ton geared steam locomotives and thirty 30-ton steel cars having round-shank couplers at one end which allow overturning in a rotary dump without uncoupling. Except for the wheels, which are 24 in. instead of 33 in., these cars have M.C.B. standard equipment.

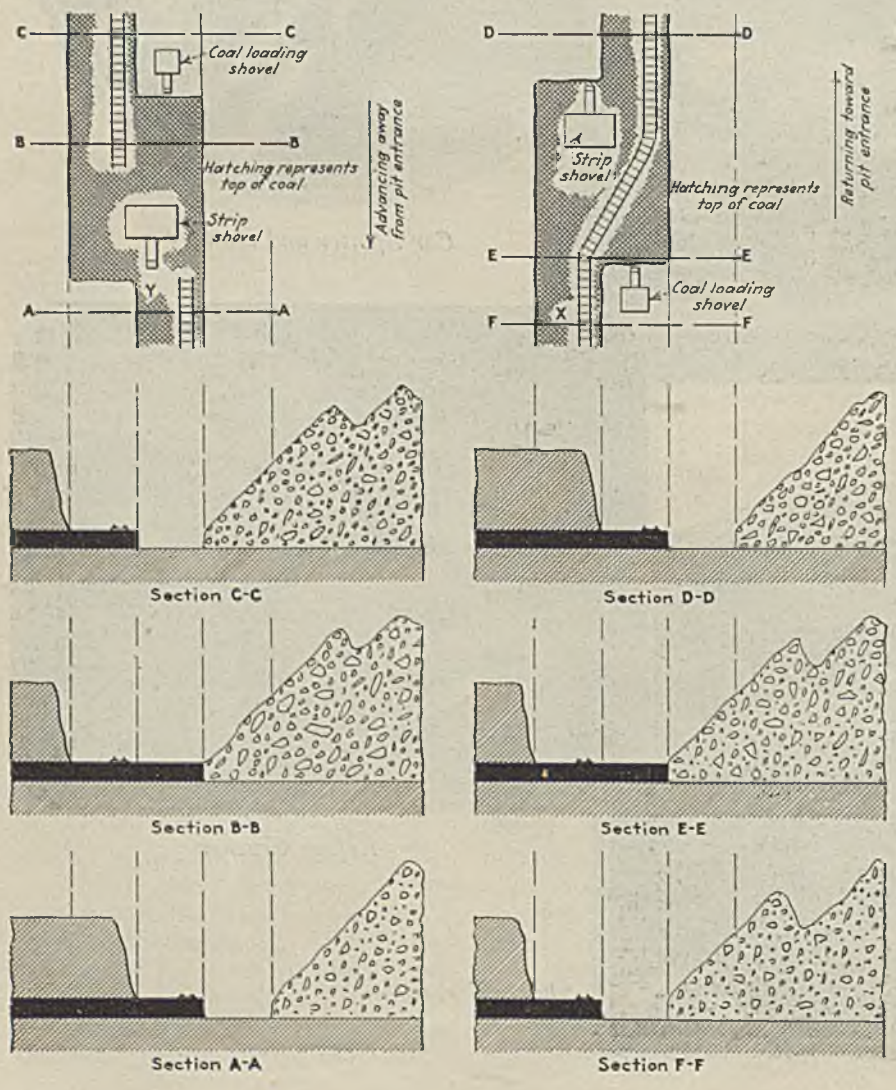
Two locomotives haul for each shovel and each remains hooked to its trip of six cars and spots the cars while the trip is being loaded. The locomotive cuts the loaded trip loose at the tipple and picks up an empty trip that is waiting.

When the first stripping shovel was set up at the mine the first job done with it was making a fill 900 ft. long for a three-track 60-car empty yard on a 2-per cent grade for handling empty railroad cars. The job of building this fill might have been a slow and expensive proposition, but with the big stripping shovel it was done in a few days.

The tipple, which has five loading tracks and one refuse track, was built of wood because great permanency is not required. The inside equipment, made by the Jeffrey Manufacturing Co. and rated at 400 tons per hour, consists of a 7-ft. shaker screen, three picking tables, three loading booms, mixing conveyor, refuse conveyor, single-roll coal crusher and a rigid-hammer refuse crusher. Four sizes are loaded regularly: crushed 6-in. lump for railroad fuel, 6x3 egg, 3x2 nut, and screenings.

The picking table refuse, consisting principally of bone coal, is crushed to 2-in. size and given to the county for road building, except at times where there is a market for this material. For handling the refuse from the tipple bin to a dump or storage pile, four 12-yd. side-dump standard-gage cars are provided. These were made by the Clapp, Riley & Hall Equipment Co., of Chicago.

Advancing and Returning Cuts of a Pit Unit



The rotary dump and feeder for handling the standard-gage 30-ton coal cars were furnished by the Roberts & Schaefer Co. By manipulation of a group of air valves one man controls the spotting of the trip and the action of the dump. The bin under the dump has a capacity of 120 tons, or four cars. Two reciprocating double-pan feeders distribute the coal onto the conveyor leading up to the tipple.

The motors which operate the conveyor, tipple equipment and dumphouse air compressor are all 440-volt. The total cost of electric power for the mine, including the stripping and loading shovels, runs from 13 to 15c. per ton. For a month when the production was 44,000 tons the power demand was 763 kw. and the consumption 336,000 kw.-hr.

With production at present averaging 2,400 tons per day and 40,000 tons per month, the total number of men is 102. The coal-loading shovels work 8 hours but the stripping shovels work 24 hours, or three shifts. Even though all equipment excepting the locomotives is electrically driven, the electrical inspection and repair work is handled by two men. A chief electrician and his helper work on the day shift but are subject to call during the night. They inspect all electrical equipment daily. Mechanical work also is handled by two men.

A reclamation program for the stripped land has been adopted. Each year 10 acres will be planted with spruce, yellow pine, and other trees. The coal company will furnish the labor and seedlings, and the Division of Forestry, Department of Conservation, State of Indiana, will supervise the planting.

The following outline of events indicates the speed with which opening of the mine was carried on: Ground was broken Sept. 13, 1926, and the first four days were spent laying track and putting up a derrick for handling material and erecting the shovels, which work was begun Sept. 17. On Nov. 13 the first stripper was put into use. The first coal was shipped Dec. 22 and 350 cars were shipped before the tipple was completed on Jan. 24, 1927. In the year 1927 565,000 tons was shipped, and on the record day, Sept. 26, 4,243 tons was handled over the tipple.

SIGNALING

In British Coal Mines

By Lionel Fokes

Walton-on-Thames, England

AT MODERN mines efficient signaling systems both above and below ground are much more essential than they were when mechanical and electrical power in coal mining were first introduced. In those days shafts were shallow, the workings less extended and man power and horse power often were relied upon almost entirely for bringing out coal; movement in consequence was slow, time was not an important factor, and signaling systems other than those of a more or less primitive nature were unnecessary.

Signaling in British coal mines today leaves little to be desired either from the viewpoint of safety or efficiency. Electric signaling, of course, has been in use many years, but the danger of gas or coal-dust ignition by electric arcs even so small as those which occur at the make-and-break of a bell circuit was not fully realized until a short time before the World War. Before that time, small compressed-air lighting plants or taps from the lighting supply were relied upon to work the signals.

The results so far as the actual signaling was concerned were excellent; but the poor insulation of the lighting circuits and of the bare signal wires often led to unpleasant incidents, minor smolderings and fires frequently occurring. Usually a crude resistance was inserted between the signaling system and the lighting supply, under the erroneous impression that the resistance reduced the voltage. It certainly limited the current, but at the point of make-and-break the full voltage was always present, so that the risk of an ignition could not be ignored. However, no serious explosion or fire was attributed to this method of operating signals, but the fact that serious accidents did not occur was due more to luck than to good judgment.

THE Coal Mines Act of 1911 put an end to experiments of that kind, for it laid down a maximum of 25 volts for signaling generally. This meant reducing the size of many of the batteries in use at the time, usually consisting of two dozen or more cells and sometimes two such groups connected in parallel. These large batteries were necessitated by the extremely low resistance of the bell coils and by the long distances over which signals were often sent by one battery. In some cases multiple bells were installed on double partings. In the absence of telephones this arrangement enabled the traffic man at the partings to judge the position of a trip and also enabled the haulage driver to signal to him in the event of derailment, a code of signals being arranged for that purpose.

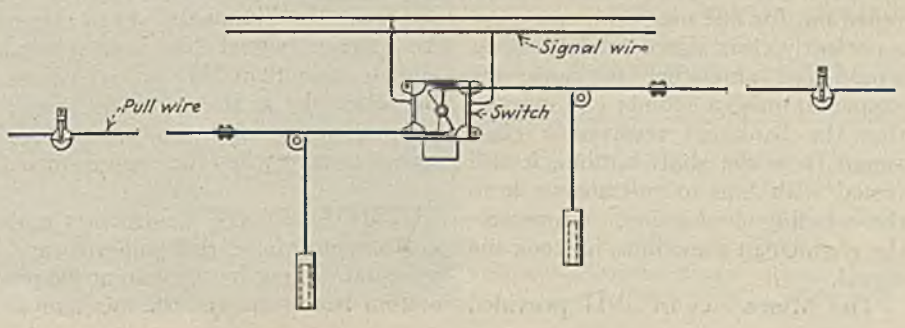
The great explosion at Senghenydd, South Wales, in 1913, resulted in an official investigation and the introduction of short-circuited windings, the bell bobbin being wound with two wires in parallel which were insulated from each other. Thus there were two separate windings on each bobbin; the ends of one were joined together to make a closed circuit, and the remaining winding operated the bell. When the circuit for ringing the bell was made and afterward broken the inductive effect of the short-circuited winding caused a current to flow in such a direction as to give rise to a magnetic field which tended to oppose the sudden withdrawal of the field caused by the working current. Thus the magnetic changes were made to slow down and the usual spark caused by interrupting the circuit of an ordinary bell was not apparent with one having short-circuited windings.

TESTS showed that although a bell with ordinary windings connected to only two or three cells would ignite a gaseous mixture when the circuit was interrupted, the same bell fitted with short-circuited windings failed to ignite gas when connected to a Leclanche battery of 25 volts. In view of these experimental results an order was issued requiring all underground signaling bells and relays to be modified so as to render them incapable of igniting a gaseous mixture on a pressure of 25 volts supplied by a battery of Leclanche cells.

This type of cell was selected because its internal resistance is in itself a safeguard against heavy currents being generated even under short-circuit conditions A further recommendation was that, where possible, relays should be employed so that the voltage in the signaling wires might be kept at a low value.

Almost coincident with these developments it became the universal practice to design underground signaling gear in flameproof inclosures. In some mines alternating-current signaling has been adopted. A small step-down transformer with an earthed shield between the primary and secondary windings is being used to prevent leakage of high-voltage current into the signaling circuit. The use of this system obviously is restricted to those parts of a mine where an alternating-current supply is readily available. The advantage

Fig. 1—Electro-Mechanical Signal System



of this form of bell lies in the absence of contacts, the hammer being actuated by a polarized magnet system.

IN BRITISH mines the universal method employed for enabling the haulage rider to signal the engineman is by two bare wires supported on insulators and running the entire length of the haulage road. At any point the wires may be drawn together and the circuit completed for ringing the bell. In order to insure good contact the riders invariably carry an old knife or piece of file with which they bridge the wires when signaling.

To safeguard against possibility of accidents due to any sparking which might by chance occur at the points of contact on the signaling wires a considerable amount of ingenuity has been expended in devising methods for eliminating them altogether. To achieve this, flameproof contact boxes have been designed to be actuated by a pull-wire, as in the system shown in Fig. 1. The contact boxes are installed at intervals along the haulage road, and between them an insulated cable is run in order to establish the electrical circuit. In addition a wire is provided so that a pull on this at any point closes the circuit in the nearest contact box, from which the signal is conveyed through the insulated cable to the haulage engineman.

For many years the system of communication between the pit bottom and bank was by mechanical rapper worked through a wire and lever. The man at the shaft bottom transmitted a signal to the bankman and he in turn passed it on to the winding engineman by another rapper — in more recent times by an electric bell.

THIS system was defective in a number of ways: (1) Due to contraction and expansion of the rapper wire with changing temperature the number of "knocks" representing a given signal often were indistinct; (2) depending, as they did, upon the energy or strength of the man at the shaft bottom operating the lever, the signals could not be relied on, for one man with ease gave a perfectly clear signal, while another would fail altogether to cause the rapper to make a sound; (3) granted that the bankman received a clear signal from the shaft bottom, it still rested with him to re-transmit it to the winding engineman. Moreover, the engineman sometimes mistook the signal.

The Mines Act of 1911 provided

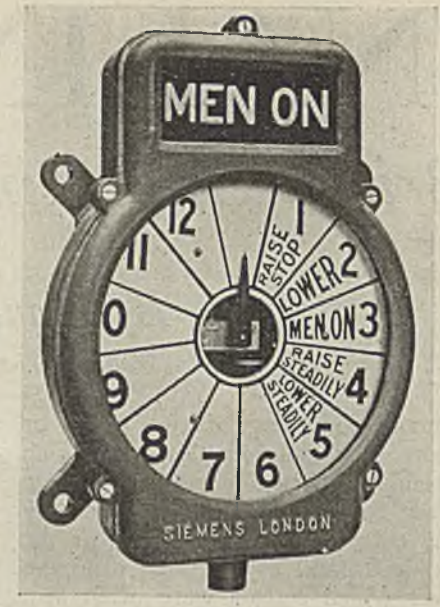


Fig 2—Ratchet Operated Electrical Indicator

that all signals sent from the pit bottom were to be simultaneously transmitted both to the bankman and engineman. Further, in 1913, it became compulsory to provide the engineman with a visual signal in addition to the aural one. The visual indication was to remain in view until the order was complied with. A further provision was that when men were riding, the word "MEN" had to be clearly indicated and kept before the engineman's notice during the hoist.

Mechanical indicators have taken many forms though the type usually employed has a circular dial and pointer which is operated by a ratchet mechanism, each pull on the rapper wire advancing the pointer one step. In some cases by means of a dashpot arrangement the pointer is arranged to return to No. 1 when a new signal is sent. Alternatively, the pointer can be returned to zero by the first movement of the engine.

A typical indicator is purely mechanical in operation, although the particular signal transmitted is electrically illuminated, besides being indicated by a pointer. The "MEN" signal, for instance, is shown in red, and remains illuminated even after the starting signal has been given. Signals other than "MEN" are wiped out when the action signal is given, being canceled and the pointer returned to zero when the engine starts.

ATMOSPHERIC contraction and expansion of the pull-wire and irregular pulling by the man at the pit bottom have rendered the mechanical indicator rather unsatisfactory and electrical signaling in various forms constitutes present practice in the majority of British collieries.

Whether mechanically or electrically operated, practically all signal indicators are operated through some form of ratchet mechanism which advances a pointer on a contact switch. One of the most widely used electrical signaling gears is that made by Siemens Brothers, Ltd., of London. The indicator itself is shown in Fig. 2. It is of the simplest construction, consisting mainly of an actuating magnet whose armature, fitted with a pawl, engages a ratchet on the spindle of the pointer and turns it one tooth for each impulse or signal. The armature of another magnet, forming the releasing mechanism, engages the same ratchet wheel to hold it in position. When the magnet is energized the armature disengages the ratchet and the pointer is returned to zero by a volute spring mounted on the pointer spindle. When at the zero position the pointer breaks the circuit of the releasing magnet so that if the releasing circuit is later closed while the pointer is still in the zero position no current can flow and the battery capacity is conserved.

The equipment provides for signaling from the pit bottom and bank or, with additional apparatus, from any intermediate level. Signals sent from the pit bottom ring bells at the bank and in the engine room and at the same time are indicated on a dial in the engine room, while signals sent from the bank register on a separate dial and ring a different bell in the engine room. Provision also is made for signaling from the bank to the pit bottom.

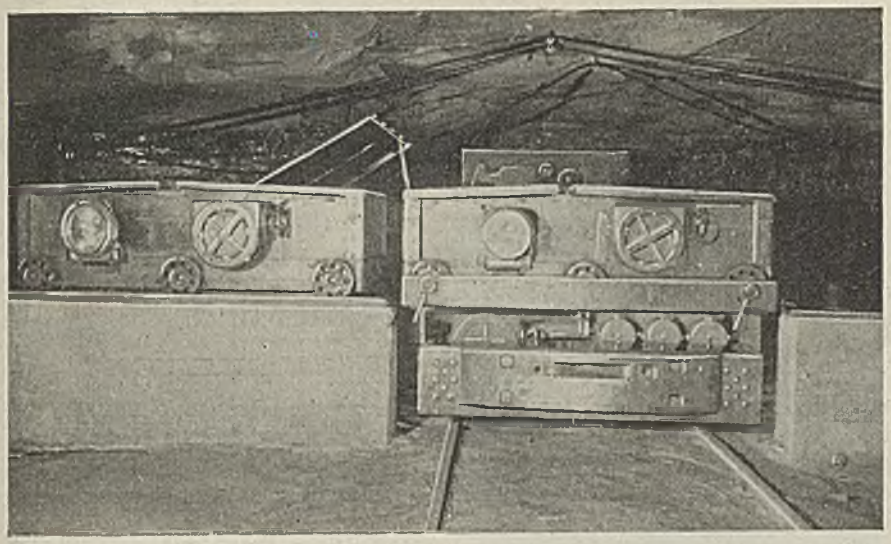
AT THE top of the dial indicator (Fig. 2) is a window on which the cautionary signal "MEN ON" is illuminated by a special arrangement of circuits and switches. In addition, provision is made to prevent accumulation of signals by a handle which must be turned by the operator and held while signalling. When the operator removes his hand the handle returns to the "Off" position and has to be turned again before giving another signal. It is the first movement of turning the handle that closes the releasing circuit and cancels any previous signal.

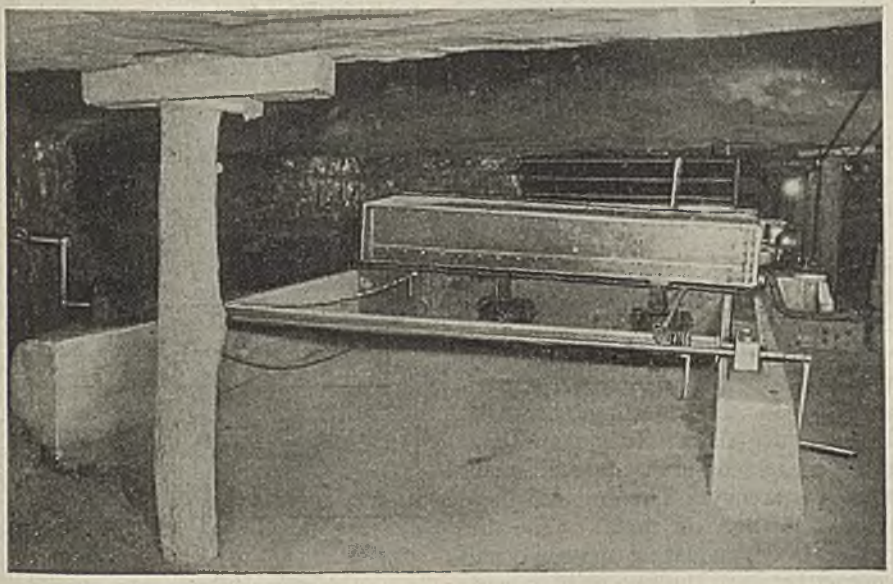
The law usually is interpreted as requiring an indicated signal to be canceled immediately it is complied

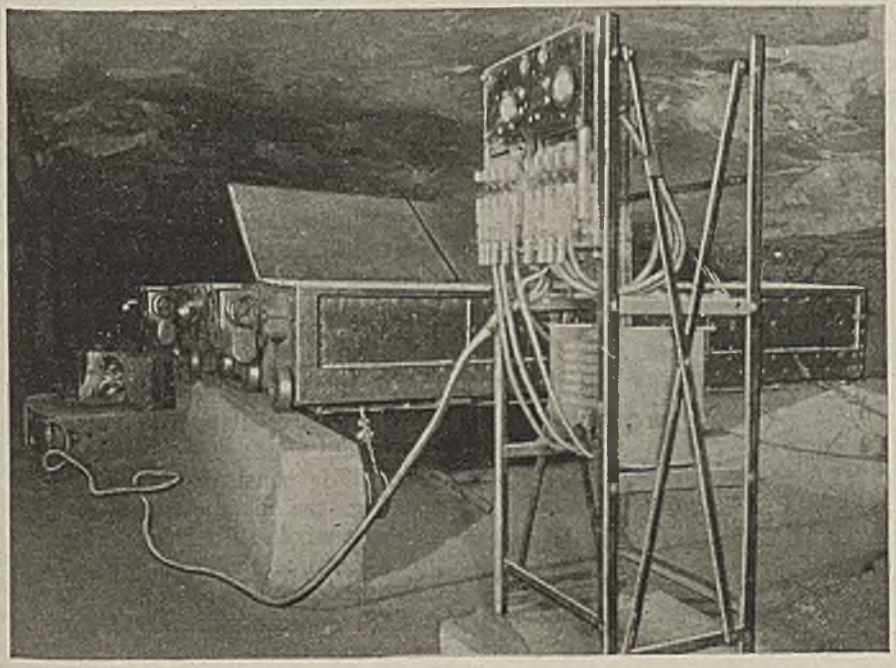
(Turn to page 488)

Conveniences for BATTERY HANDLING

Increase Output Per Unit







GATHERING locomotives and cutting-machine power-supply trucks first received at Bartley "wireless" mine of the Pond-Creek Pocahontas Coal Co., Bartley, W. Va., were equipped for the end-racking method of battery removal and replacement. With this system the locomotive or power truck is run into a stall where elevated rails set with a slight pitch raise the battery from the chassis. The chassis is then pulled out from under by another locomotive or by power supplied through a portable cable, and is switched into a stall where a charged battery is waiting.

Later, a gathering locomotive equipped for side racking was purchased. Removal of the battery is accomplished by sliding it sidewise onto elevated rails. The wheels or rollers on which the battery is carried are mounted permanently on the sides of the compartment. This appeared to be an improvement over the other method, so when three main-haulage locomotives were purchased, side-racking was specified.

THIS method was preferred because but one mine-track stall is required for each locomotive and its extra battery. Also there is no need for towing the chassis or operating it by portable cable to a different stall to pick up a charged battery.

R. E. Salvati, manager, realizes that his battery equipment must be given every possible advantage. Maintenance cost is reduced by providing convenient means for the electrician to make tests and inspections and to add water to the cells. Production delays are cut by quick battery changing and the results of thorough maintenance.

The accompanying sketch and

Top—End View Locomotive in Transfer Stall Beside Spare Battery

Center—Showing Windlass Chains Hooked to Battery on Chassis

Bottom—Showing Chains Hooked to Battery Pulled Off of Chassis

photographs show the home-made windlass arrangement with which each of the main-hualage side-racking stalls is equipped. When a locomotive comes in to exchange batteries, the discharged battery on the chassis and the charged battery resting on the charging rack are hooked together. Next the two chains of the windlass are hooked to the other side of the chassis battery. The windlass is then turned by a hand crank, pulling the batteries sidewise, one off the chassis and the other on. Three minutes is sufficient time for the chassis to be held in the stall for the change.

The windlass works in either direction, the lower chain of each pair being carried through a steel pipe to the opposite side, where its direction of pull is reversed with a sheave.

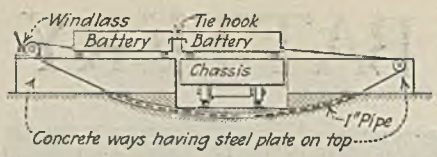
A SIMPLIFIED charging panel with a grid unit of low resistance is mounted beside each charging stall. Adjustment of resistance is effected by means of several single-pole knife switches rather than by a dial switch. An ammeter and voltmeter complete the equipment of each panel.

The main-haulage locomotive weighs 20 tons with battery, has 10-ton electric motor equipment, and a 250-volt 110-cell 23-plate lead battery rated at 72 kw.-hr. A 99-cell 33-plate 225-volt lead battery rated at 95 kw.-hr., which will fit in the same battery box, will be tried when the next replacement battery is purchased.

The mining-machine power truck has a 110-cell 31-plate 250-volt lead battery rated 99 kw.-hr. The gathering locomotive battery, also of the lead type, is 48-cell 110-volt 39-plate and is rated at 55 kw.-hr.

A REMARKABLE production per battery-powered unit is now being obtained. Two arcwall machine units working one shift are cutting the entire mine production, which at times has exceeded 2,500 tons per day. These machines start at 6:30 p.m. At 10:30 p.m. one is taken to the barn, where the partly discharged battery is left and a fully charged battery taken aboard. The partially discharged battery is placed on charge, and at 1:30 a.m. the other cutting unit leaves its battery and picks up the newly charged one. Three batteries thus supply power for all of the cutting.

High mechanical and electrical efficiency are of prime importance in a battery locomotive. For this



Section of Transfer Stall and Charging Racks

reason considerable experimenting has been done on the gathering locomotives at Bartley. Motors of different design were installed and in some cases worm drives replaced by spur gear reductions.

In March six gathering locomotives with a total of eight batteries gathered an average of 97 cars, or 373 tons, each per shift. The average haul was 800 to 1,000 ft. The record was 140 cars, or 539 tons, gathered by one locomotive in one shift with one battery charge.

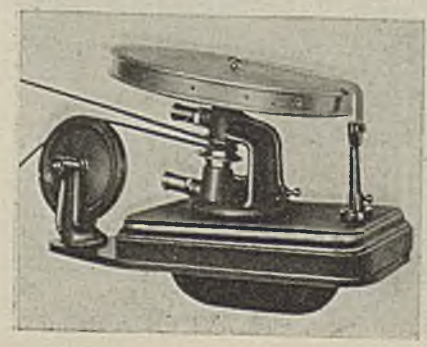
Signaling in British Coal Mines

(Continued from page 486)

with and calls for some form of releasing switch. The one usually employed on electrical signaling gear is of the "governor" type driven by a belt from the winding engine. It consists of weights controlled by springs, the weights moving out as the speed increases. Provision is made to allow signals such as "Stop" to be registered while the cage is in motion. The luminous "MEN ON" signal remains on until the end of the wind, where it is canceled by a special slip-and-catch arrangement.

Another ingenious type of releasing switch (Fig. 3) uses mercury. It is of the rotary type and is driven by belt from the winder. Essentially it consists of a circular aluminum housing set about 30 deg. from the horizontal. In this housing, arranged radially, are fifteen tube-shape contactors, each containing a small quantity of mercury. The ends of these contactors are of metal while the center is of insulating material, and contact between the two ends is made when the mercury is allowed to slowly trickle from one end of the tube to the other. With this switch the releasing circuits are closed at $\frac{1}{10}$ of a revolution, but at a very slow speed the mercury is driven to the extreme ends of the contactors,

Fig. 3—Mercury Operated Releasing Switch



breaking the releasing circuits so that a "Stop" signal can be sent.

The latest development in visual signaling is a system devised by the Automatic Telephone Manufacturing Co., Ltd. An example of this type is shown in Fig. 4.

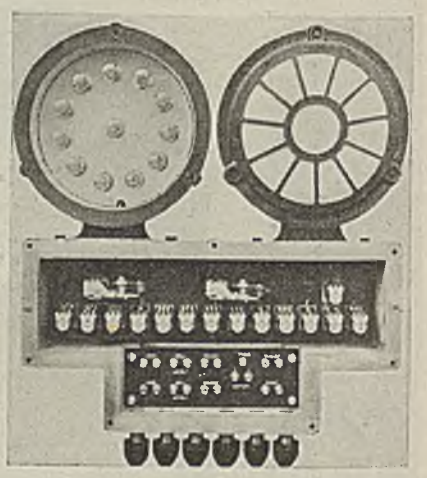


Fig. 4—Luminous Signal Indicator, Cover Removed

Some of the special operating features of this indicator are: (1) The action signals are non-cumulative and are canceled by the first movement of the winding engine; (2) the cautionary signal "MEN ON" remains displayed throughout the wind, and unless repeated during the wind is canceled when the engine stops; (3) in the event of "MEN" being sent during a wind and before the cage comes to rest—as is customary at some collieries—the cautionary signal will remain visible throughout the succeeding wind. In other words, if "MEN" is consistently sent during winding, the signal remains visible until the whole shift has been wound up or down, as the case may be, with consequent saving of time. All the A.T.M. indicators are fitted with an emergency "Stop" signal.

COAL DUST FOR OIL

In Engines as in Boilers

HAVE we wasted years on years in the development of boilers when we could just as easily have generated power by the direct combustion of finely powdered coal in a cylinder? That seems possible. In 1911, says *Power*, the Kosmos Machine Works of Goerlitz, Germany, began to make experiments on a pulverized-coal engine but it could not ignite the coal dependably till 1916. Ignition finally was provided in a vertical 16½ x 25-in. single-cylinder four-stroke cycle engine built in 1906 and rated at 80 brake horsepower. After a few changes the engine operated entirely successfully with pulverized coal of all kinds found in Germany or with oil or with a mixture of oil and coal, with lignite, peat, sawdust, charcoal, rice dust, flour and even coke.

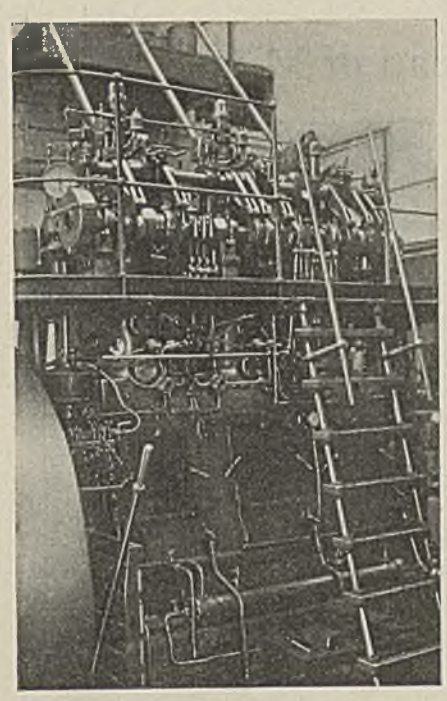
When the engine was first started it developed a maximum of 120 hp. After three years of daily operation it still has a similar capacity of 110 hp., showing that the wear is slight.

When delivering 87 hp. the engine consumed 80 lb. of pulverized brown coal, which can be bought in Germany for 9c., containing about 10 per cent of ash. The exhaust is free from combustible and appears as a light brownish haze. It has not even smudged a 30-ft. wall only a few feet away.

No ash must be permitted to enter between the piston and the cylinder wall. This is prevented by admitting clean compressed air at 880-lb. pressure between the piston rings to fill the spaces between the cylinder wall and the piston. With this piston air seal the engine has operated for years. The original piston rings, installed in 1916, were not changed till 1924. At that time the cylinder had worn only 0.08 in.

It is said that in Germany using pulverized coal the engine will generate a horsepower at a cost of only 0.12c. The cost with oil would be about 0.45c. The savings therefore are about 80 per cent.

The cost of building a pulverized-coal motor is said to be no higher than that of an oil engine of equal capacity. No outside service of heat is required to start it. It is claimed that it is 30 to 35 per cent more efficient than the most efficient steam turbine and delivers power at a lower cost than any other fuel-burning prime mover.



Coal Is Fed to Engine Itself

Dr. Otto invented the gas engine 60 years ago; Dr. Rudolph Diesel 30 years ago brought out the fuel-oil engine. Now comes the pulverized-coal engine. Will it displace oil? Even if it does the economics it will effect will offset the new markets that coal would otherwise receive. If, moreover, lignite is more suitable than bituminous it may upset our values and rearrange our producing centers. Who knows?

Why Not Mine Coal in Illinois By Retreating Longwall?

(Continued from page 476)

ment, and that it was agreed that every class of labor should be on a day rate, I have made an approximation of the equipment required to operate two panels, its cost, and the cost per ton to deliver the coal to the railroad cars, assuming that the seam is 7 ft. thick and undercut 7 ft. with one cut loaded out of each place every 24 hours, which seems a reasonable requirement.

A pillar 100 ft. thick at an angle of 30 deg. yields a working face 115 ft. long, which, under the assumed conditions, should give 225 tons, or a total for the 32 pillars of 7,200 tons. As an average of at least 35 narrow places 12 ft. wide will be in operation, including crosscuts, 900 tons can be added to the above, making a total of 8,100 tons to be loaded out each day.

If it is assumed that the mine operates 20 days a month throughout the year the monthly average will be 162,000 tons and the cost per ton will be apportioned somewhat as in Table II.

Table II—Cost To Operate Mechanized Workings

Management	
1 mine manager	$500
2 assistant managers	600
2 mine examiners	500
5 in engineering corps	1,000
	$2,600
Office	
Salaries of officers, office help, expenses, etc.	$10,000
General	
Royalties @ 5c	$8,100
Supplies and repairs @ 15c	24,300
Interest @ 6% on $1,500,000	7,500
Taxes and insurance	9,000
Compensation insurance	3,600
Depletion @ 3c	4,860
Depreciation @ 10c	16,200
Contingent fund @ 2c	3,240
Obsolescence fund @ 2c	3,240
Sinking fund @ 10c	16,200
	$96,240
Power	
162,000 tons @ 10c. per ton	$16,200
Haulage	
16 motormen, gathering @ $8	$2,560
16 trip riders, gathering @ $8	2,560
8 motormen, main-line @ $8	1,280
8 trip riders, main-line @ $8	1,280
	$7,680
Ventilation	
12 men @ $7.05	$1,692
Pumping	
4 men @ $7.05	$564
Timber	
162,000 tons @ 5c. a ton	$8,100
Outside labor	
4 hoistmen	$1,200
3 electricians	750
2 weighmen @ $8	320
8 car trimmers @ $6	960
15 slate pickers @ $5	1,500
6 smiths @ $10	1,200
4 carpenters @ $10	800
6 extra men @ $5	600
1 outside foreman	300
	$7,630
Inside labor	
46 machine men @ $10	$9,200
96 conveyor operators @ $10	19,200
12 car trimmers @ $7.05	1,692
20 drillers and shotfirers @ $10	4,000
80 timbermen and conveyor movers @ $7.05	11,280
8 trackmen @ $10	1,600
8 electricians @ $10	1,600
4 section foremen @ $10	800
	$49,372

Summary	Dollars	Cost per Ton Dollars
Office	$10,000	0.061
Management	2,600	.016
General	96,240	.594
Power	16,200	.100
Haulage	7,680	.048
Ventilation	1,692	.010
Pumping	564	.003
Timber	8,100	.050
Outside labor	7,630	.047
Inside labor	49,372	.305
	$200,078	$1.234

Approved List of PERMISSIBLE EXPLOSIVES

Issued by Bureau of Mines

IN ORDER that the user of explosives may be assisted in selecting an explosive to meet a specific requirement, the U. S. Bureau of Mines now classifies permissible explosives in two ways: (1) On the basis of the volume of poisonous gases produced by 1½ lb. (680 grams) of the explosive, and (2) on the basis of the characteristic ingredient of each explosive.

Most of the permissible explosives, even when properly and completely detonated in a drillhole in a coal mine, produce poisonous gases, but they produce at the same time a much larger volume of non-poisonous gases. In order that the poisonous gases may not under normal conditions become a menace to the lives or health of miners, no explosive is now or can become permissible if it evolves upon detonation more than 158 liters (5½ cu.ft.) of permanent poisonous gases, as determined by tests in the Bichel pressure gage.

Field tests of an explosive made under extreme conditions for the production of the greatest percentage of poisonous gases in the air show that in a narrow entry, with no ventilation at or near the face, a 1½-lb. charge of an explosive, which gave 158 liters of poisonous gas in gage tests, produced 0.18 per cent of carbon monoxide (the only poisonous gas present) in the air when the sample was taken two minutes after the shot. Another sample of the air taken two minutes later contained 0.08 per cent of carbon monoxide.

It is therefore evident that where ventilation is not active, as in a closed heading, miners or shotfirers should not return to the face until at least five minutes after a shot. At all working faces that are difficult to ventilate, explosives of class A or class B should be used, preferably those of class A.

The classification on the basis of the volume of poisonous gases produced by 1½ lb. (680 grams) of the explosive is thus listed by the Bureau:

Class A, those explosives from which the volume of poisonous gases produced is not more than 53 liters.

Class B, those explosives from which the volume of poisonous gases is more than 53 liters but less than 106 liters, inclusive.

Class C, those explosives in which the volume of poisonous gases is more than 106 liters but less than 158 liters, inclusive.

Scott Turner
Director, U. S. Bureau of Mines

Explosives are classified in accordance with their characteristic ingredients as follows:

Class 1, Ammonium Nitrate Explosives.—To class 1 belong all the explosives in which the characteristic ingredient is ammonium nitrate. This class is divided into two subclasses. Subclass *a* includes every ammonium-nitrate explosive that contains a sensitizer that is in itself an explosive. Subclass *b* includes every ammonium-nitrate explosive that contains a sensitizer that is not in itself an explosive.

The ammonium-nitrate explosives of subclass *a* consist principally of ammonium nitrate with small percentages of nitroglycerin, nitrocellulose, or nitro-substitution compounds which are used as sensitizers. The ammonium-nitrate explosives of subclass *b* consist principally of ammonium nitrate with small percentages of resinous matter or other non-explosive substances used as sensitizers.

Ammonium-nitrate explosives when fresh and properly detonated are well adapted for use in mines that are not unusually wet. They are not suitable for use in wet mines, for if the contents of a cartridge of ammonium-nitrate explosive is exposed for only a few hours to the damp atmosphere the explosive may so deteriorate as to fail to detonate completely, because ammonium nitrate takes up moisture readily.

The redipping of cartridges of ammonium-nitrate explosives aids in protecting the contents against moisture or moist air, and the cartridges should be so stored and handled as to preserve the efficacy of the paraffin-like coating. The explosives should be obtained in a fresh condition and

Permissible Explosives as of June 30, 1928*

Brand	Class Designation Basis Vol. Poisonous Gases	Class Designation Basis Characteristic Ingredient	Weight of 1¼x8 Inch Cartridge, Grams	Smallest Permissible Diameter, Inches	Unit Deflective Charge, Grams	Rate of Detonation In 1¼-Inch Diameter Cartridge, Ft. per Sec.	Manufacturer †
Apache Coal Powder A	B	1a	137	1¼	222	11,710	1
Apache Coal Powder B	B	1a	158	1¼	241	8,200	1
Apache Coal Powder D, L. F.	A	1a	160	1¼	235	10,820	1
Apache Coal Powder E, L. F.	A	1a	162	1¼	230	11,250	1
Apache Coal Powder F, L. F.	A	1a	160	1¼	225	11,090	1
Apache Coal Powder S	B	1a	181	1¼	303	5,710	1
Austin Red Diamond No. 9, L. F.	A	1a	134	¼	223	6,330	3
Austin Red Diamond No. 10, L. F.	B	1a	124	¼	248	8,070	3
Austin Red Diamond No. 2-A, L. F.	A	1a	175	¼	252	10,760	3
Austin Red Diamond No. 6-A, L. F.	A	1a	176	¼	220	13,610	2
Austin Red Diamond No. 1-D, L. F.	A	1a	147	¼	225	12,430	3
Austin Red Diamond B, L. F.	A	1a	147	¼	205	11,380	3
Austin Red Diamond F, L. F.	B	1a	142	1¼	207	8,460	3
Austin Red Diamond G, L. F.	A	1a	162	1¼	237	6,760	3
Big Red No. 1	B	1a	171	¼	240	7,250	5
Big Red No. 7	A	1a	186	¼	227	10,000	5
Bituminite 1	C	4	187	1¼	318	12,790	8
Bituminite 5	A	1a	176	1	231	9,120	8
Black Diamond No. 2-A	C	4	190	1¼	281	12,600	9
Black Diamond No. 3-A	C	4	156	1¼	294	11,150	9
Black Diamond No. 5	A	1a	180	¼	288	6,040	9
Black Diamond No. 5, L. F.	A	1a	175	¼	222	8,590	9
Black Diamond No. 6, L. F.	C	4	158	1¼	306	9,640	9
Black Diamond No. 7	A	1a	183	¼	214	10,730	9
Black Diamond No. 15	A	1a	160	¼	217	6,560	9
Black Diamond No. 17	A	1a	172	¼	222	10,790	9

purchased in such quantities as will permit their prompt use. Experience at the Pittsburgh experiment station of the Bureau of Mines shows that ammonium-nitrate explosives usually will detonate completely after storage for six months in a well-ventilated magazine.

Class 2, Hydrated Explosives.—To class 2 belong all explosives in which salts containing water of crystallization are the characteristic ingredients. The explosives of this class are somewhat similar in composition to the ordinary low-grade dynamites, except that one or more salts containing water of crystallization are added to reduce the flame temperature. They are easily detonated and most of them can be used successfully in damp working places.

Class 3, Organic Nitrate Explosives.—To class 3 belong all the explosives in which the characteristic ingredient is an organic nitrate other than nitroglycerin. The permissible explosives now listed under class 3 are nitro-starch explosives.

Class 4, Nitroglycerin Explosives.—To class 4 belong all the explosives in which the characteristic ingredient is nitroglycerin. These explosives contain free water or an excess of carbon, which is added to reduce the flame temperature. A few explosives of this class contain salts or an unusually low percentage of nitroglycerin, that reduce the strength and shattering effect of the explosives on detonation. The nitroglycerin explosives have the advantages of detonating easily and of not being readily affected by moisture.

Class 5, Ammonium Perchlorate Explosives.—To class 5 belong all explosives in which the characteristic ingredient is ammonium perchlorate.

Class 6, Gelatin Explosives.—To class 6 belong all explosives in which the nitroglycerin is gelatinized with nitrocotton.

The last class of explosives have been grouped together at the end of the list because these explosives have been specially designed for rock shooting in coal mines, although under certain conditions they have been found suitable for shooting coal also. The rate of detonation given for these explosives is that determined when the explosives were submitted for test. *It should be kept in mind, however, that this rate may vary between 2,000 and 5,000 meters per second.*

The complete active list of permissible explosives tested prior to June 30, 1928, is shown in the accompanying table.

Permissible Explosives as of June 30, 1928*

Brand	Class Designation Basis Vol. Poisonous Gases	Class Designation Basis Characteristic Ingredient	Weight of 1¼x8 Inch Cartridge, Grams	Smallest Permissible Diameter, Inches	Unit Deflective Charge, Grams	Rate of Detonation In 1¼-Inch Diameter Cartridge, Ft. per Sec.	Manufacturer †
Carbonite No. 5	C	4	175	¼	304	10,140	4
Carbonite No. 6	C	4	175	¼	345	7,480	4
Carbonite No. 7	C	4	150	¼	334	7,450	4
Coalite A, L. F	A	1a	166	¼	204	11,580	2-6
Coalite B, L. F	B	1a	138	¼	205	11,380	2-6
Coalite C, L. F	A	1a	168	¼	215	12,200	2-6
Coalite D, L. F	A	1a	154	¼	214	12,070	2-6
Coalite E, L. F	A	1a	168	¼	237	6,230	2-6
Coalite F, L. F	B	1a	180	¼	362	4,620	2-6
Coalite G, L. F	A	1a	152	¼	218	7,970	2-6
Coalite H, L. F	A	1a	180	1	260	6,360	2-6
Coalite I, L. F	A	1a	168	¼	267	9,250	2-6
Coalite M, L. F	B	1a	124	¼	207	9,640	2-6
Coalite S, L. F	B	1a	138	1	213	7,710	2-6
Coalite T, L. F	A	1a	139	¼	224	5,970	2-6
Coalite Y	B	1a	164	¼	235	10,300	2-6
Coalite No. 4, L. F	B	4	150	¼	307	7,810	2-6
Coal Special 2-W	C	4	180	1½	277	11,580	8
Coal Special 3-C	C	4	192	1½	288	9,770	8
Collier B	B	1a	156	¼	207	10,960	8
Collier B, L. F	A	1a	153	¼	210	11,380	8
Collier C, L. F	A	1a	141	¼	217	11,970	8
Collier X, I. F. 2	A	1a	165	¼	228	9,970	8
Collier 11	A	1a	165	¼	217	11,680	8
Cronite No. 1	A	1a	149	1½	233	10,500	2
Duobel No. 2, L. F	A	1a	143	¼	209	9,970	4
Duobel, L. F	A	1a	147	¼	225	12,430	4
General 1	A	1a	168	¼	208	10,660	4
General 6-X	A	1a	194	1¼	220	10,500	4
Grasselli LC, L. F	A	1a	160	¼	216	5,940	7
Grasselli 2, L. F	B	1a	142	¼	221	10,860	7
Grasselli 5, L. F	A	1a	156	¼	223	7,680	7
Grasselli 6, L. F	A	1a	162	¼	218	9,220	7
Grasselli 7, L. F	A	1a	131	¼	217	8,000	7
Grasselli 10, L. F	B	1a	124	¼	221	8,270	7
Hercoal F	B	1a	92	1¼	231	9,120	8
Hercules Coal Powder 2	A	1a	186	1¼	212	9,280	8
Lomite No. 1	B	2	176	1¼	300	13,940	2
McAbee Y	B	1a	149	1¼	228	10,860	2
McAbee Z	A	1a	151	1¼	212	10,590	2
Mine-ite No. 5-D	A	1a	161	¼	241	8,720	7
Mine-ite No. 6-D	B	1a	169	¼	224	8,100	7
Miners Friend No. 1	B	1a	167	¼	223	11,580	2
Miners Friend No. 2	B	1a	166	¼	242	10,330	2
Miners Friend No. 4, L. F	B	1a	166	¼	249	9,970	2
Miners Friend No. 5, L. F	B	1a	166	¼	250	8,560	2
Miners Friend No. 6, L. F	B	1a	166	¼	224	10,890	2
Monobel No. 1, L. F	A	1a	176	¼	231	12,860	4
Monobel No. 2, L. F	A	1a	175	¼	252	10,760	4
Monobel No. 4, L. F	A	1a	175	¼	252	10,760	4
Monobel No. 5, L. F	A	1a	170	¼	249	6,400	4
Monobel No. 6, L. F	A	1a	176	¼	220	13,610	4
Monobel No. 8, L. F	A	1a	169	¼	217	8,230	4
Monobel No. 9, L. F	A	1a	134	¼	223	6,330	4
Monobel No. 10, L. F	B	1a	124	¼	248	8,070	4
Monobel No. 11, L. F	A	1a	123	¼	222	9,050	4
Peerless No. 1	B	1a	148	¼	217	11,050	10
Peerless No. 2	A	1a	164	¼	212	8,400	10
Peerless No. 4	A	1a	152	1¼	220	6,560	10
Peerless No. 6	A	1a	153	1¼	222	6,530	10
Peerless No. 8, L. F	B	1a	126	1¼	223	9,220	10
Peerless No. 10, L. F	B	1a	130	1¼	222	9,680	10
Red H B, L. F	A	1a	155	¼	213	12,140	8
Red H C, L. F	A	1a	168	¼	216	5,870	8
Red H. D, L. F	A	1a	150	¼	214	7,740	8
Red H F, L. F	A	1a	130	1	210	7,450	8
Red H J, L. F	A	1a	164	¼	209	7,540	8
Red H No. 1	B	1a	167	1¼	216	11,710	8
Red H No. 4	B	1a	164	¼	248	8,990	8
Red H No. 4-A, L. F	B	1a	170	¼	227	9,350	8
Red H No. 5	B	1a	170	1	267	6,760	8
Red H No. 6	B	1a	162	¼	218	10,360	8
Red H No. 11	B	1a	151	¼	210	11,090	8
Red H No. 14	B	1a	151	¼	236	10,460	8
Tristate Special No. 1	B	1a	130	1¼	223	7,050	12
Trojan Coal Powder M-2	A	3	178	1	232	10,660	12
Trojan Coal Powder M-3	A	3	184	¼	229	12,000	12
Trojan Coal Powder M-5	A	3	188	1	230	12,790	12
Trojan Coal Powder M-6	A	3	190	1	242	11,810	12
Trojan Coal Powder P-1	B	3	154	1¼	224	9,380	12
Trojan Coal Powder P-2	B	3	174	¼	226	12,890	12
Trojan Coal Powder P-3	B	3	176	1	230	13,280	12
Tunnelite C	A	1a	187	1¼	255	10,070	2
Union A, L. F	B	1a	165	1¼	214	11,680	13
Union B, L. F	B	1a	162	1¼	248	10,270	13
Union D, L. F	A	1a	163	¼	223	11,090	13
Union F, L. F	B	1a	142	1¼	207	8,460	13
Union G, L. F	A	1a	162	1¼	237	6,760	13
Union H, L. F	B	1a	147	1¼	217	8,430	13
Vigorite No. 5, L. F	C	4	165	¼	304	10,820	2-6
Vulcan Coal Powder No. 1	C	4	160	1½	335	7,810	11
Vulcan Coal Powder No. 2	B	4	164	¼	283	10,660	11
Xpdite No. 1	C	4	211	1¼	259	10,960	8
Gelatin Permissible Explosives							
Gel-Coalite X, L. F	A	6	239	¼	253	9,610	2
Gel-Coalite Z, L. F	A	6	226	¼	237	16,600	2-6
Gelite I L. F	A	6	248	1½	255	8,330	7
Gelobel	A	6	236	¼	259	15,250	4
Hercogel	A	6	241	1	257	8,690	8

* These explosives are permissible only when used in accordance with the requirements set forth in Schedule 17A, approved April 1, 1926, and when used with electric detonators of not less efficiency than No. 6.

†[1] Apache Powder Co. [2] Atlas Powder Co. [3] Austin Powder Co. [4] E. I. du Pont de Nemours & Co. [5] Equitable Powder Manufacturing Co. and Egyptian Powder Co. [6] Giant Powder Co. (Con). [7] Grasselli Powder Co. [8] Hercules Powder Co. [9] Illinois Powder Manufacturing Co. [10] Peerless Explosives Co. [11] Puget Sound & Alaska Powder Co. [12] Trojan Powder Co. [13] Union Explosives Co.

NOTES

From Across the Sea

IN THE early days of scientific rescue work it took some moral courage to carry canaries into the mines as an indicator of carbon monoxide. The public had a little difficulty in grasping what such birds had to do with mining or rescue work.

Comes now a rival to the canary with a slightly different sphere of action—the cricket, that lively little rascal that creeps into the house to keep warm as winter days approach and that for centuries has snuggled into the rifts of the large open fireplaces of our ancestors, delighted to enjoy a heat that most creatures would find unbearable.

In a paper read by C. E. Morgan to the South Staffordshire and Warwickshire Institute of Mining Engineers on June 25 he said that the "old men" of Warwickshire believed that where the crickets in the mine chirped the coal had already reached the critical temperature which would cause spontaneous combustion or, at least, to such a temperature as made that critical point imminent. He thought that any place where crickets chirped was worthy of examination. They furnished an earlier intimation than could be obtained from the "gob stink"—the smell which is given off by the heated coal only when a certain menacing temperature is reached.

THE author conjectures that it may be the issuing of gas from breaks at fairly high temperatures or some constituent of the "damp" that makes the crickets chirp. Incidentally it may be added that J. Ivon Graham said that experiments with crickets showed that they preferred a temperature of from 85 to 90 deg. F. L. Holland remarked that they left as soon as smoke appeared.

Mr. Morgan says that the heating of coal drives out the moisture, both that regarded as "free" and some of that which forms a part of what is known technically as "volatile matter." This moisture, getting into cooler parts of the mine, is deposited as sweat beads on girders and bars, thus giving an indication of incipient spontaneous combustion.

Three odors are noted: (1) that of decaying timber in a warm and confined space; (2) an odor that tickles the throat and the root of the nose and gives an intense desire to swallow, this probably being due to pyritic oxidation and the evolution of gaseous sulphur compounds; (3) an odor of warm, dry timber, probably due to distillation or bacterial decay or both. In one case a smell more sour than usual was traced to its sources and seemed then to resemble the odor of fungus and to emanate from warm and damp wood. Timber also "sweats" and gives off a pine-like odor in mines which are subject to spontaneous combustion. "Smelling trouble," consequently, is hardly a metaphorical expression in some coal mines. In later stages a paraffin- or gasoline-like odor appears.

When timber is involved there are acrid emissions that affect the eyes, nose, throat and mouth. This paraffin odor is accompanied by an oily taste in the mouth similar to that obtained when tasting transformer oil. When one is exposed to it for some time there is a metallic taste in the mouth and on the tongue much as if cold steel were laid on the latter. As "fire stink" turns to smoke this gustatory effect progressively becomes less; in fact, when the smoke stage approaches the suffocating effect declines.

A pipe may be provided in the closed area and by smelling and inspiring the air from that pipe some idea of conditions may be obtained. A quiescent heating is indicated by an extremely sour and unpleasant smell, whereas renewed activity is at once indicated by "fire stink." Where a heating has been arrested and the oxidation processes have commenced progressively to decrease, the suffocating "stink" tends to disappear and the metallic taste is intense.

Incipient spontaneous combustion causes (1) a general sensation of heat and discomfort accompanied by "streaming" perspiration and sometimes (2) a slightly painful prickling of the skin, when exposed to damp, and (3) immediate, slight and distinctly temporary frontal headache. Prolonged exposure or brisk movement produces lassitude, sleepiness and a feeling of great exhaustion, the legs particularly being affected, due doubtless in part to high humidity and dry-bulb temperature and to the presence of certain gaseous emanations of early stages of oxidation, notably carbon monoxide.

Mr. Morgan declared that the hygrometer was being used to determine the incipience of spontaneous combustion and N. Forrest stated that he had used that instrument as indicated with advantage.

Discussion developed that the oils used in the mines, including that in brattice cloth, produced smells which sometimes caused false alarms as to the heating of the coal.

R. Dawson Hall

On the ENGINEER'S BOOK SHELF

The Cost of Living in Twelve Industrial Cities; 76 pp., 9x6 in., cloth; National Industrial Conference Board, New York City; price $1.50.

This volume contains the results of an investigation conducted by Miss F. B. Brower and assistants of the National Industrial Conference Board's research staff in twelve representative American industrial cities between August and October of 1927. Three classes of cities were selected: large cities which included Boston, Cleveland, New York and Philadelphia; medium cities which included Dayton, Reading, Springfield and Syracuse; and small cities which included Butler, Leominster, Lockport and Marion.

In each of these cities data were collected concerning retail food prices, housing costs, cost of fuel and light, clothing prices and sundries. The interesting fact disclosed in the summary and conclusions is the small difference of $4.19 found between the highest and lowest weekly living cost of the twelve cities investigated.

Two appendices are included, one containing a list of the neighborhoods visited and the other various tables showing budgets and comparing items of living costs in the various cities.

* * *

The Road to Plenty—A Publication of the Pollak Foundation for Economic Research; 232 pp., octavo; by William Trufant Foster and Waddill Catchings; Boston, Houghton, Mifflin Co.; price $2.

In this book Foster and Catchings offer their solution for the "dilemma of thrift." The theory which the authors have propounded is this: That economic depressions, with their accompanying unemployment, idle factories and capital, etc., are due to the reduction in consumer purchasing power, and that this reduced purchasing power is due, in turn, to the abstraction of both corporation and individual savings from the cycle of money flow between producer and consumer. This, then, is the di-

lemma: that the worker—who is also a consumer—is urged to save, but by his savings brings about depression. He saves to his own ultimate disadvantage.

The cure for this condition, the authors believe, lies in the increased construction of public works and production facilities at just a sufficient rate to make up for the loss due to the abstraction of savings. Thus, by putting money into the hands of workers, the purchasing power always is kept even with productive capacity.

Their proposal, specifically, is this: That the federal government collect data that will disclose at any time the relationship between productive and consumptive capacities and, when the latter tends to decline, to increase public works construction. Such expanded construction will act as a balance wheel in itself and will encourage industry to start an expansion program. Obviously, the data now available are not sufficient to indicate when trouble is brewing. Now we know where we are only when the depression is upon us. To serve a preventive purpose the data will need to be much expanded, and this is what Foster and Catchings recommend.

Looking at their proposed remedy, it is patent that the problem is a complex one and that the solution will not be easy. There is the difficulty, first, of getting all the data; second, of knowing what the data mean; third, of setting up the mechanism for wise and speedy increase of public works construction. But, as the authors maintain, we should not go on hopelessly and helplessly, shrugging our shoulders and saying, "it cannot be helped." The problem is made by humans. Humans should try to solve it. We shall stumble and halt and make mistakes, but we shall not progress toward a solution unless we try.

The proposal to use public works construction to absorb available labor in time of depression has been made at various time, by the President's Unemployment Conference during the 1921 depression, for example, and a bill authorizing such use of federal construction work is now before Congress.

* * *

Questions and Answers on Timbering Bituminous Coal Mines; 32 pp., octavo; by J. W. Paul; U. S. Bureau of Mines, Miners' Circular 31, U. S. Government Printing Office, Washton; price 10c.

This booklet is perhaps not intended to break any new ground, and it certainly does not do so. It is probably ill-adjudged to tell the miner that he ought to use that with which he has not been provided. Still something might have been said as to steel straps and as to the props that yield under pressure instead of breaking.

Much more might a few words have been devoted to advocating the use of long caps or timbers extending from two props beyond either of them toward the face; as to timber resting at one end on a post set near the face and at the other end in a recess cut for that purpose in the coal; as to sprags set in under the undercut to prevent the premature fall of the coal when thus undermined, and as to cocker sprags where the coal tends to fall forward at the mine face.

Something might have been said as to the right way of erecting a post on pitching ground or on fireclay moving away from under a rib; on the practice of pointing props, of building them up on slack or of placing them loosely so as to make allowance for sag or heave. If any one or all of the last three practices are bad, then they should be condemned, for they are by no means unknown. No reference is made to loading out the coal in the road line of a room before removing any other and to setting a safety post before loading out the rest of the cut.

Every class of mine needs its own rules and book of questions and answers. This book was written for a certain class of mines, possibly with West Virginia in mind. For these, perhaps, it will serve well, as containing nothing extreme.

* * *

Mining Engineers' Handbook, by Robert Peale; 2523 pp.; 4¼x7 in.; John Wiley & Sons, Inc., New York City; price $10 in one volume, $12 in two.

One hesitates to suggest that this bulky volume have added to it a single line more than it now contains, yet when examined by a critical coal-mining engineer it seems lacking in some features that are fully entitled to recognition. Among these are the shaking chute and the duckbill loader, stripping by the casting and drag-scraper methods used in the bituminous coal fields, slabbing methods of operation and longfaces. In most details, however, the authors have brought the book into the forefront of progress.

H. I. Moulton handles subsidence. He declares that some authorities believe the roof develops fractures on the surface over the pillar and some that the roof fractures are entirely within the excavated area. But is he justified in giving both views? Some also, it may be observed, hold that the earth is round, while others believe it is flat, yet in geographies it is not customary to publish both points of view though that notion is so strongly held in some parts of the country that it is taught in the schools.

It is generally conceded by all who have studied the matter that fractures have in many instances formed over the pillar; the fact has been repeatedly proved and could be postulated even in lack of proof from the laws of nature; so why give the other view any consideration? Proven facts cannot be dissolved by mere doubts. Underground fractures occur between the pillars, and surface fractures are formed in some cases above the excavated area and in others above the coal. Theories of subsidence must meet all those facts without blinking.

Among the authors that coal men will recognize are W. M. Weigel, the late R. V. Norris, R. E. Hobart, F. E. Brackett, G. R. Wood, Charles M. Means, G. S. Rice, J. V. N. Dorr, Paul Sterling, the late H. McKean Conner and Howard N. Eavenson.

* * *

Songs and Ballads of the Anthracite Miner; 196 pp., octavo; by George C. Korson; Grafton Press, New York City; Price $3.

To those who like local color this book will appeal. It has its interest even for those not well acquainted with the anthracite region or imbued with its memories. Much more interest will it have for those who have been born and bred in the anthracite field.

Most of the ballads and songs were written by British and Irish working men. They cover chronologically only a relatively short period of time and geographically only a small area. Consequently the collection is not an anthology. It has not chosen the best only but taken all it could get, and the best are none too good. The ballads are not nearly as rhythmic as those which have been collected in anthologies of somewhat similar character published in the lands of these same people. They are more nearly the equal of the broadsides which were circulated in England in the nineteenth century and displayed in shop windows.

The gatherer of folk lore in general usually rejects material of a high order. America has its native folk songs and ballads which are truly rhythmic and picturesque and some, like those of Bret Harte, are about mining, but none of these was written in the anthracite region and, if any of them had been, they would have been regarded as literature rather than bar-room ballads.

The songs in this book strike a strongly antagonistic note. They were written by people who, perhaps, were a little homesick and not by men contented with their lot. In this they contrast strongly with British ballads like the "Nut-Brown Maid" and those of the New York theaters, which are truly indigenous. These songs of Mr. Korson's gathering are full of the class struggle. The one ballad written "when the heart was light"—to quote the author—and entitled "The Pretty Maid Milking Her Goat," is mocking rather than sympathetic.

One of the best of them is in dialect:

Me no afraid for nottin';
Me dey never shcare;
Sure me shtrike tomorra night;
Dat's de business, I don't care.
Right a-here me telling you—
Me no shcabby feller,
Good union citizen—
Johnny Mitchell man.

To George G. Korson the writing of the book was a by no means inconsiderable labor of love; and in good literary style he has prefaced the ballads. His attitude of mind throughout is evidenced by the fact that the book is reprinted from the *United Mine Workers' Journal.*

COAL AGE

Published by McGraw-Hill Publishing Company, Inc.

JOHN M. CARMODY, *Editor*

NEW YORK, AUGUST, 1928

Proof of the pudding lies in the eating thereof

FOR several years the United Mine Workers has made a gallant fight against deflation of wages in the bituminous coal fields of the country. Leaders of that organization have been committed to the theory that high wages were the foundation stones of national prosperity. It was a good theory; it still is: it is a theory subscribed to in principle by both the modern school of business economists and by hard-headed captains of industry.

Unfortunately for the union and its followers, interests who were unwilling to subscribe to that theory as it was enunciated by the United Mine Workers were sufficiently strong to establish an opposition which could not be broken down. The immovable body met the irresistible force and the impact was disastrous to the immovable body and those bound to it. To defend a principle the union lost a principality. Last month it took unblinking stock of the situation and authorized the remnants of its once mighty army to make such terms of honorable peace as conditions would warrant.

Just how great has been the actual surrender to realities, however, will be known only in the results of the negotiations now going on between operators and representatives of the district union organizations in Illinois and Indiana. Officially the Jacksonville basis is no more. But until an agreement on "a basis mutually satisfactory" is worked out in those two states it will not be clear whether the corpse has been decently interred or whether the walking death that dogged the Midwest the last few years still haunts the scene.

"For this relief much thanks"

REFRIGERATED air for buildings undoubtedly will be speeded by this extremely hot summer. The movement has lagged somewhat because of the low heat maxima of recent years, but when it becomes general it will do more than any other to expand the use of fuel. Already, in the neighborhood of the metropolis, which is by no means the leader in such refrigeration, the Roxy, Keith's Palace, Proctor's Midway, Jefferson, Hamilton, Paramount, Rivoli, Franklin, Coliseum and Tremont theaters in New York City, the Kenmore and Congress in Brooklyn, the Stanley in Jersey City, the Branford in Newark, and the Fabian in Hoboken, all have air refrigeration or "manufactured weather," as also have the Paramount Lasky Studios, the Paramount News Reel Laboratories, the Fox Movietone Studio and the National Broadcasting Studios.

The new 44-story, 2,506-room New Yorker Hotel, which will need as much air as the largest of mines—namely, 440,000 cu.ft. per minute—will have air conditioned by tempering and reheating coils. Sufficient capacity to exhaust 600,300 cu.ft. per minute also will be provided.

The cooling of this hotel will require only a 100-ton ice machine, whereas the refrigerating plants for cooling the food will be supplied with two units each of 120 tons. In addition a 15-ton machine will supply the ice. So, after all, refrigerated air in hotels is not such a tremendous expense; quite a little less expensive than the ice box.

Seeing, however, what the increase in business will mean when the idea becomes universal, what is the coal industry doing to advance it and the companion program of powdered coal? The boiler plant at the New Yorker will exhibit this trend also, for it will use pulverized fuel exclusively, having four boilers fed from four unit pulverizers.

The days will soon be past when summer weather will be swelter weather for those who can stay indoors. Every decade has its striking development. Will the next, when it comes, be flying or will it be summer comfort at home, in the theater and church, at factory and store? Winter comfort is achieved, and coal has performed it. Now relief from summer heat is beckoning if we will but take notice.

Who is it gets hurt?

MOST managers look over their compensation records and conclude that as most of the accidents happen to miners the hazard is greater for them than for other men. But the greatest risk is faced by motormen and snappers. One company found that at one mine it had fifteen accidents and at another five in six months. In the first mine there were eighteen men of this occupation and at the other twelve. In consequence the first mine had an accident rate of 166.6 per cent per annum and the other one of 83.2 per cent.

Drivers had a 110 per cent accident rate at one mine and 30 per cent at the other. Machine men had an 88.8 and 76.8 per cent accident rate. The fireboss rates were 66.6 and 40 per cent respectively and the tipple men 85.6 in one case and zero in the other. On the other hand loaders had accident rates of 26.2 and 16.6 per cent, large enough but much smaller than some other classes.

Had the company officials for whom these returns were compiled been told their accident rates in certain occupations ranged as high as they do, it is quite likely they would have indignantly denied

that fact. But the figures are there to prove the contention. Yet at other mines they probably are higher. In truth—it is likely they would be higher at this mine if snappers were segregated from motormen.

Where a class of men in the mine includes no more than a few individuals, only by comparing the accidents of the particular occupation with the number of men engaged in it can the inadequacy of the protection thrown around these men and their recklessness, if they are reckless, as they often are, be properly gaged and corrected. The numbers of these men at any mine fortunately are not large, and from a statistical point of view the figures must always be regarded as defective, but as they always seem to run high for motormen and snappers, as has been shown in some Pennsylvania returns by R. M. Hosler, it would be well at every mine to give haulage accidents the most careful consideration.

One way to cut maintenance cost

MORE complete mechanization stimulates effort to reduce the cost of equipment maintenance and to decrease breakdown delays. Almost invariably an investigation of a high maintenance cost indicates that there is something wrong with the organization method of handling the work. Past practices, and in some states the mine laws, dictate that the inside electricians report to the mine foremen, but frequently, unless the electrician is an exceptionally good man and the foreman a man of unusual ability as a manager, the equipment suffers accordingly.

A general dissatisfaction with the old system is evidenced by inquiries such as the following from an official of a prominent company: "Do you know of any low-cost operations where the mine electricians report to someone other than the mine foreman?" Two outstanding instances come to mind, one in West Virginia and one in Illinois. In one case the electricians and helpers at all mines report to the chief electrician of inside equipment, who maintains headquarters at the central shop, and at the other all electricians report to the chief electrician of the operation in an underground shop near the main shaft.

The coal-mining industry is not behind other industries in applying the most efficient repair methods in the central shops. The trouble lies in the care of equipment before it reaches the point that requires it to be shopped. The industry is lax in applying the principles of inspection, stitch-in-time repairing and careful handling, which spell the difference between costly operation of equipment and economy. This is partly due to inherent conditions, such as scattered equipment, operation in locations difficult of access, total lack of natural light and dangers that are difficult to predict and control. These are unknown to other industries.

A mine foreman has plenty to do without worrying about the maintenance of equipment. The relief from such duty—a byproduct of the effort to cut the operating cost of equipment—alone is considered very important by officials of some companies. When mine foremen have fewer duties they can concentrate their attention on major problems and do a better job.

Past practice, inherent conditions, and perhaps a certain amount of prejudice, tend to delay a change; but there is evidence that it must come soon. It is not reasonable to expect good supervision of equipment unless the entire responsibility is vested in a man who is a specialist in that work.

Pulverized-coal engine promises new field

ACCORDING to R. Pawlikowski, in *Power,* an engine which will derive its power from exploding pulverized coal with air in its cylinders has been built and has been operating for twelve years. Apparently the public has been obsessed with unnecessary fears when it approached the problem of using coal in a cylinder. It was thought that ash would choke up the engine; a cleaner fuel must be used. It was surmised that the ash would score the cylinder; no liners could resist the abrasion. But it proves not to be so after twelve years of operation. There is no caking or slagging on the piston, cylinder, valves or port surfaces. The fine dust is expelled with the exhaust. There is little wear. The engine still has its original piston and cylinder lining.

Apparently the coal used has been lignite but at times "hard coal"—by which we suppose is meant bituminous coal, as anthracite is not found in Germany—having an ash content of 16 per cent has been mixed with brown coal having 20 per cent ash.

One wonders why an engine that did so well should have been kept running for twelve long years before receiving public consideration. A few rumors were afloat, it is true, but now we know the name of the owner and that Professors Bosch and Klingenberg were permitted with hundreds of engineers to view the demonstration.

If it is all that is anticipated, what will it mean to the coal industry? Probably further economy, but some gain also, as it will aid in driving out oil. It may have some effect on the progress of electrification, for pulverized coal can be delivered in tanks to the factory and the engines can be run automatically and efficiently with the fuel. It has the advantage of eliminating all stand-by losses, for the engine can be used at a moment's notice. The economy will be tremendous. It is said also that the operation of the engine is smokeless. For these reasons its development may be speedy—and will be if all the good things said about it prove true.

The BOSSES *Talk it Over*

Check Up on Supplies

"WELL, MAC," said Jim, "the Old Man just called up and wanted to know why we ordered another car of ties. He said we ought to have enough already to pave the mine. At that, we've been using quite a few lately."

"If I could get a chance to gather up some in those sections we've got standing," Mac replied, "I'd have plenty to do me for some time. I've been thinking it over and I believe we ought to have a system of recovering not only our ties and track but also our timber, wire and supplies, and the like. I think what we get back ought to more than pay for the labor."

Jim thought it over for a minute. "That sounds like a good idea," he said. "Maybe we can rig up some special supply cars to help out. It just occurs to me also that we might dig into our supply costs and see if we can't standardize on some figure. Along with that we might jack up our distribution system and save a little there."

"That last is a good thought," said Mac. "We lost half a dozen new trolley frogs last week. The wire man said they were to come in on the motor, but they never reached him. At any rate, we can't go far wrong on checking up on our supplies and we ought to save some money."

What means can be employed to recover supplies that may be used again?

Do you think a definite supply cost per ton should be decided on and not exceeded?

What method of distributing supplies would be suitable for mine use?

All foremen and superintendents are urged to discuss these questions
Acceptable letters will be paid for

Day Labor a Vital Item in Cost Sheet

Foresight and Co-operation Necessary in Hiring Daymen

DAY LABOR COSTS can be held at a minimum providing the mine works the same number of days every month throughout the year. However, if the mine works 24 days one month and only 18 days the next it will be impossible to produce coal at the same cost in the latter as in the former.

It seems to me, if I understand Jim right, that there was no co-operation between Jim and Mac at all. Mac had been simply hiring daymen as they came along, regardless of how much work there was to be done and how much the coal would cost. If some of his loaders left when Laurel Run mine started, no doubt some of his daymen left at the same time, but instead of hiring loaders he hired daymen.

If I were Jim and Mac and my tonnage fell off, I would simply lay the daymen off in proportion to the loss in tonnage. These would include men that were not giving satisfaction in their work. There should be a standard force at each mine and when that force was increased, there should be a good reason for it.

A practical foreman will always give enough work to each one of his daymen to keep him busy the whole shift. As far as production reports from daymen are concerned, the mine foreman that would go by these reports, not knowing himself if the work was actually done, would soon have his mine in bad shape. Suppose Mac had a force of 80 daymen, do you think he would read all the reports? To read some of them would tax even a professor from State College without some outside help.

Hooversville, Pa. JOHN BOHN,
Mine Foreman.

Complete Records Essential To Economical Production

INCREASED costs around a coal mine, like those in factories, call for instant and careful consideration, as only by eternal vigilance can any mining company operating on a close margin hope to survive in this day of competition.

Day labor costs are one of the many units in the economical production of coal. They can be estimated to a certain degree, but must be figured in advance to yield the most profits during the life of the mine. Figures made without careful forethought are not to the best interests of all concerned.

Best results in mining are obtained by a knowledge of the vein of coal, its height and the character of the roof and floor. Then, upon starting to mine, the management will have a general idea of how many men will be required to obtain a certain daily tonnage, can finance their company accordingly and will have a general idea of when the venture will be profitable.

To promote economy, daymen should be selected according to their knowledge and efficiency. Then if they are not willing to give an hour's work for an hour's pay they should be placed at the face, where they can be idle without it reflecting in the cost sheet.

Many mine foremen who would not think of using a dollar of their company's money unnecessarily are unconsciously doing so by not securing a proper amount of work from their men. In addition many of the companies are adding to the cost of coal and decreasing the physical worth of their properties by closely restricting the mine foreman in the use of day labor and supplies. This policy results in badly worn machinery and a run-down mine.

These adverse conditions keep the employees from working at their full capacity. An insufficient force also will result in the loss of supplies, which would have been saved had there been men enough to properly look after them. Yet the mine boss, with all his other duties, must make the best of it with a crippled day force and receive the blame for the additional cost.

WRITING from Indiana, one reader says: "I get a lot of information from the Mac and Shorty pages that will prove useful to me in my future work."

How do you think the problem on the opposite page should be handled?

Every coal company should know what it costs to perform a certain piece of labor in its mines, such as the timbering of a haulage road or the laying of a piece of track. However, if it has no system that will give the exact time required and the amount of material used in any job the cost cannot be ascertained. Not knowing the exact cost per ton for any one day the officials are not assured that the coal has been mined in the most economical and profitable manner.

To ascertain these facts a card-index system similar to those employed in the manufacturing industries should be used. Then if a particular section of the mine is not producing its proportionate part of the tonnage, the extra day labor in that part can be transferred elsewhere or put to loading coal, with a corresponding cost reduction.

J. A. R.,
Assistant State Mine Inspector.
Sullivan, Ind.

Mac Faces Dissatisfied Men And Mounting Cost Sheet

THE OLD MAN, Jim and Mac seem to have run into a situation that is not to be easily relieved. The eternal vigilance necessary to success was lacking. The Old Man, Jim and Mac all seem to know that section 4 is an undesirable portion of the mine. From their conversation it appears they have been using too much labor in that particular section, possibly at the expense of other more desirable sections of the mine.

It is probable that Mac has shifted some of his more undesirable loaders into this territory with the "Root, hog, or die" idea in his mind. Probably, too, new coal loaders have been placed there as they were hired, during the slack season just passing, while the older, more permanent employees received places in the better parts of the mine. No doubt, many of these undesirables and "suitcase" men have been of the type that loaded a small tonnage and left the mine early. To get as much tonnage from them as possible, Mac probably has stationed more gathering equipment there than would be necessary to get the same amount of coal in other parts of the mine where the men work a full shift.

Now that part of his section 4 loaders have left, the same force is being used to gather a smaller tonnage, and may be held on the territory in hope that more loaders will be secured. The thought lurking in the back of Mac's head is that he can say to prospective employees: "Here's a good place on section 4; there's a little rock to clean, but not many men on the haul. The gathering motor hasn't enough to do, and you can get all the cars you want as fast as you can load them."

Very likely in the endeavor to hold up the tonnage more track men than necessary have been kept on this section and all the places laid up as fast as possible, so that the "undesirables" could get out of the mine early. Some collusion between track men and loaders may have resulted in overtime for catching up jobs that should have been finished during the shift. Now that many of the loaders on the section are gone, full track crews are still being maintained, and are working the old overtime racket on Mac and, incidentally, on the cost sheet.

It is to be presumed that Mac also has been employing his track force to clean up slate and set a few timbers for the loaders in this section, and now, in his anxiety to secure men for this territory, he is using them to make all the places look as attractive as possible to new loaders.

Mac is now between the devil and the deep blue sea. He wants tonnage, and it looks as if he is going to have to get it with fewer loaders. At the same time he wants to keep the best of his

daymen. The situation might be helped by shifting some of the gathering equipment and labor to other sections, the increased tonnage being relied upon to overcome the loss in section 4. The excess trackmen put in to take care of the extra equipment should also go to the other sections or be dispensed with.

Mac will have to do some missionary work among the loaders in the sections where he is placing the extra equipment, to hold them in the mine until the shift is over. Otherwise, they will load their usual tonnage and leave the mine earlier than before.

Jim and Mac can hardly arrive at a definite amount of day labor for a given tonnage, because conditions are constantly changing around any mine. The amount of labor required today may be entirely inadequate tomorrow, though it is possible that closer supervision will render some of it superfluous. From time to time the haul of the various gathering crews will become longer, decreasing the production from certain sections. However, this should be compensated for by the development of new territory where the haul will be shorter.

Grades in some sections may be difficult, making it hard to secure maximum tonnage from men and equipment. Some motormen may get more from a given piece of machinery on a particular haul than others. If Mac is on to his P's and Q's he will experiment; that is, he will shift his men in order to get the maximum amount of effort from each.

If Jim kept a daily record of tonnage average per loader, and also the average loaded per dayman, any unusual deviation from the approximate day-by-day average would be immediately noted. The damage could then be repaired before it had any appreciable effect on the monthly cost sheet. IVAN J. ELY.
Acme, W. Va.

Cost Balance Often Depends On How Daymen Are Placed

DAY LABOR COST can be kept at a minimum at each mine by employing a standard force. However, the number of day laborers at one mine or in sections of the same mine will differ, as there always is a variation in natural conditions. The cost of day labor often is given little attention in considering the cost balance, and in the majority of mines day labor is the least efficiently organized department of any. This is due in part to the changing conditions of employment.

The amount of day-labor charges will increase constantly unless proper placing of the men and conditions under which they work are carefully controlled. Conditions of employment should always be such that the laborer can deliver an honest day's work for an honest day's pay, as no man can work in dangerous and unhealthful surroundings without loss of efficiency and morale.

Many mines keep extra daymen to insure a full crew in case of sickness, layoffs or quitters. Ordinarily this is not a good policy; it will be found, however, that a few extra men for some of the rated jobs are necessary. By proper supervision this extra cost can be held at a low figure.

If I were Jim or Mac and my tonnage dropped on account of a bunch of men quitting, I would let my surplus daymen load coal by the ton or fix places for them to load by the day. If neither of these alternatives satisfied them and they could not be employed at their regular jobs, they should be laid off. It often is wise to keep a place or two working on the block system for loaders with little experience and extra daymen.

A production report is practical and has several advantages in that it shows what the day worker has accomplished. A man feels that his foreman knows what an honest day's work is and that he expects to see it on his report. Reporting also stimulates competition between men doing the same type of work.

H. T. WALTON,
Wolfpit, Ky. Superintendent.

Control Size of Day Force By System and Foresight

LACK of control of day labor cost at the average mine of appreciable size ofttimes does not rest primarily on the shoulders of the operating department but can be attributed to all departments from the general manager's office down. The Old Man's statement: "I never saw a mine with as many daymen in it as this one," sounds as familiar as some of the old adages. In fact, it recalls an experience of some years ago when the writer was connected with a private engineering firm which did the work for several large coal companies in northern West Virginia.

It seemed that none of the boys in the operating departments of a number of these companies knew 30 days ahead just how long their respective mines would be in operation. They were always in doubt as to just how to control or limit their day-labor organizations. In fact, they were always led to believe that big tonnage was just around the corner and they were very alert to protect themselves by holding their daymen. It was only natural for them to take advantage of every opportunity to have sufficient working places and good mining conditions for the contemplated increase in tonnage.

Depressed market conditions, other mines starting up or shortage of coal loaders always result in the average mine executive holding onto his day labor organization, as the average mine superintendent together with his entire executive force always gets a kick out of large production, and no stone will be left unturned to obtain it.

I am of the opinion that if the management of any mine would know the exact production schedule 30 days ahead, the adoption of the day-labor budget system would prove to be a money saver. The use of this system would enable the operating department to control the day labor in such a way that it would coincide with the fluctuating force of loaders. In all probability the ordinary operating cost would equal the cost during peak production periods.

I am not in favor of production reports except for obtaining facts relative to the various departments connected with the production of coal. Too much red tape is just as bad as none at all.

C. T. GRIMM,
Buckhannon River Coal Co.
Adrian, W. Va.

Concentrated Mining Advised

KEEPING day-labor cost at a minimum is a big problem around any coal mine, but it can be solved by the systematic use of a standard force or a labor budget. In the first place a standard force of daymen for any section should include just enough to keep that particular section going.

In Mac's case the loss of a number of loaders would mean a corresponding reduction in the number of daymen. Decreasing the day labor may be difficult in some cases, however, and he may have to retain the full force. This will result in an increase in cost on this section, which might be lessened by concentrating all the loaders in a small area and eliminating unnecessary traveling for machinery and men. Whenever the tonnage shows a drop concentrated mining should begin at once, as "wait and see" methods don't always work. As soon as new loaders are available the section can be built up to normal tonnage.

Production reports from daymen are certainly practical and are almost a necessity in this day of efficiency and low cost. In the past the problem of day labor received little attention, and even at present the laying out of jobs for daymen is very inefficiently done in many instances.

Reports submitted by daymen may be checked by the foreman or his assistants in their daily rounds, and are of considerable value as guides to a fair day's work. WM. W. HUNTER.
Mount Hope, W. Va.

Though Tonnage Decreases Costs Remain at Same Level

IT seems to me that Mac and Jim should be able to take care of the haulage and track-laying costs in Section 4 if the conditions are as Jim has described them. However, having to clear out a bunch of daymen every four or five months shows that Mac's Section 4 is an emergency section, or one that men won't work in when they can get work some place else. The abnormal conditions to be contended with not only reflect in Mac's cost but all along the line.

If we suppose that Section 4 has fallen off 200 tons a day, this naturally puts a machine crew out of commission as well as a gathering locomotive crew and a track-layer. If the trouble stopped there Mac's problem would be solved. However, Section 4 is de-

veloped and conditions do not improve while it is standing, so the timbermen must be retained and the fireboss and section boss must still make their rounds. In the final stage five daymen have been removed and two high-priced machines are standing idle. Naturally Mac offered these five men places in Section 4, but, like the rest, they find it more profitable to move.

Before Laurel Run started up Mac was running 2,000 tons of coal a day, and his development and equipment would have allowed him to keep this up indefinitely. The two 20-ton haulage locomotives are still making the same number of trips to the shaft bottom each day, but at quitting time they are 200 tons short of their drag, or just 90 per cent efficient compared to their previous average.

Since total cost is the dominating factor we find that every day or monthly man from the trapper to the Old Man himself is only 90 per cent of his previous value to the company, yet pay day calls for the same 100 per cent. To abandon Section 4 is out of the question, yet its large labor turnover is not helping Mac's accident rate. As the men at the face are not responsible for the abnormal condition and since pay day is their chief inducement to work, Mac should forget the scale being paid in the normal parts of the mine, and pay a rate in Section 4 that will enable these men to earn as much as the men in other sections. This scale would keep his men satisfied and on the job.

It might be possible to let a dayman or two out, but if they are key men it is not good practice, although done at times. Too much work is thrown on those that are left, usually meaning that a few important things may be left undone, sometimes with disastrous results.

I believe that production reports from daymen are practicable and will gain results without great expense to the company or inconvenience to the daymen. The requirement is a box with a slit in the lid, placed at the mouth of mine. Each dayman is provided with a book made on the same principle as the common slip book used in most credit stores. At the end of shift each man could make out his report and drop it into the box as he passed out at night. In addition to filing the report he would retain a carbon copy for future reference.

ROBERT EMERY.

Neffs, Ohio.

Force of Qualified Daymen Should Be Kept at All Times

IN THE world of coal operation today the one single item on which executives focus their undivided attention is the bottom line of the cost sheet. There lies the story of the day's or month's operation. Many coal mines have problems that can be solved only on the ground, and it may be that the Old Man's problem is an exceptional one, where only exceptional remedial measures can apply. However, I have chosen a few items from my experience that can be applied to the average coal mine and that will make for economy as well as safety.

The force of daymen in most coal mines usually is composed of haulage men, tracklayers, timbermen and the bottom force. The haulage end is not unusually difficult once the capacity of the motor is established and the methods and mechanisms in common use adopted in a practical manner. Switchers can be reduced to a minimum compatible with safety and dispatch. With the haulage cost reduced to an adequate level, the costs to be given careful scrutiny are those that apply at the face of the coal.

Trackmen should be efficient, the number being determined by the speed at which the rooms or entries are being driven. This same statement applies to the timbermen, though the nature of the roof is a large factor in the ultimate amount of labor required.

Before discussing labor costs further there are several things that should be recognized as essentially important. The supply of track, timber and mining equipment in general should be adequate and suitable to the immediate needs. If a large mine car is in use it is the utmost folly to use light track, or old, worn-out, broken-backed or surface-bent rails. Track ties should not require replacement during the life of the room. Bad ties cause derailments and the subsequent delay means a loss of money. Room props should be furnished in suitable lengths and the room boss should make it his business to see that they are set properly.

Daymen should be, and generally are, the most efficient men in a coal mine. None but the best should be tolerated and, where possible, steady work should be furnished them to make their earnings adequate. Beyond a doubt mine tracklaying or timbering is a business in itself, and the efficient employee in either is a valuable asset to any coal mine.

To secure best results build up a force of daymen especially qualified in their particular line and have adequate supervision. Coal mines usually are developed sufficiently to take care of the maximum tonnage and an established force of daymen need never be changed. However, in the event of a squeeze or any other condition arising that occasions the laying-off of a portion of the loaders, a proportionate part of the daymen should be put to work preparing new territory or given a turn with the other daymen in their particular line. It is the rule that, once an organization of skilled daymen has been perfected, their retention, with due consideration for the maintained tonnage, will result in decreased costs.

Panama, Ill. ALEXANDER BENNETT.

Trade Literature

Monitor Controller Co., Baltimore, Md., has issued two leaflets giving price list and parts for its Thermaload Starter, junior size—frame K, and Thermaload Starter, standard size—frame A.

Elliott Company, Jeannette, Pa., has issued these publications: Bulletin N-8, illustrating and describing Vacuum Atmospheric and Pressure Type Power Plant De-aerators; 16 pp. Bulletin S-8, 8 pp., illustrating and describing the use, operation and construction of Double Automatic Triple-Duty Valves. Bulletins H-3, H-4 and H-5, 4-pp. folders covering the forms "BP," "CP," and "DP" Turbines for mechanical drive. Bulletin N-9, 8 pp., illustrating and describing the Cartridge Type Desuperheater.

The Reliance Electric & Engineering Co., Cleveland, Ohio, has issued Bulletin 1087, covering Fully Enclosed and Semi-Enclosed Motors.

Light Rails—Mine and Industrial Steel Cross Ties. Carnegie Steel Co., Pittsburgh, Pa. Fifty-page booklet devoted to standard rail drilling, splice-bar punching and notching, etc. Table of rails and accessories is included.

Separator Magnets. Electric Controller & Mfg. Co., Cleveland, Ohio. Four-page folder illustrating and describing operation of these magnets.

Tipple Equipment. Kanawha Mfg. Co., Charleston, W. Va. Catalog No. 10. Pp. 39.

Globe-Wernicke Co., Cincinnati, Ohio, has issued a 24-pp. booklet on a system for the filing and indexing of maps, plans, drawings and similar large sheets.

In a 4-pp. folder issued by the explosives department of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., Two Devices for Short-Circuiting Leading Wires are illustrated and described.

Aldrich Pump Co., Allentown, Pa., has issued Data 57, a 4-pp. folder on its Porcelain Kosmos Plungers for acidulous and gritty mine waters, as well as water for drinking and other purposes.

Controlling Crusher Wastes with Woven Screens, Section I. Ludlow-Saylor Wire Co., St. Louis, Mo. 18-pp. bulletin containing a discussion of screen openings. The book is well illustrated.

Publications Received

Mineral Resources of the United States, 1925, by Frank J. Katz. Bureau of Mines, Washington, D. C. Part I—Metals; 768 pp. Part II—Non-metals; 615 pp.

Questions and Answers on Timbering Bituminous Coal Mines, by J. W. Paul. Bureau of Mines, Washington, D. C. Miners' Circular 31. Pp. 32; illustrated. Price, 10c.

Report on the Mines of Nova Scotia, 1927. Part I has 320 pp. and Part II 759 pp.

Bituminous Coal Fields of Pennsylvania—Coal Resources, by John F. Reese and James D. Sisler. Topographic and Geologic Survey. Department of Forests and Waters, Harrisburg, Pa. Pp. 153; illustrated. Bulletin M6. Part III.

Thermodynamic Properties of Oxygen and Nitrogen, by Russell W. Millar and John D. Sullivan. Bureau of Mines, Washington, D. C. Technical Paper 424. Price, 15c. Pp. 20; tables. Two charts.

Stabilization of the Coal Industry and The Sand Flotation Process, by H. M. Chance. H. M. Chance & Co., Philadelphia, Pa. Pp. 9.

Outdoor Recreation for Employees. Policyholders' Service Bureau of the Metropolitan Life Insurance Co., New York City. Report No. 76. Pp. 20.

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

Trend to Low-Voltage A.C. Motors Calls for Study of Limitations

THE use of machinery driven by low-voltage alternating-current motors has grown to be such an important factor in mining operations that a more complete understanding of the nature and limitations of alternating current for this service should be valuable. A knowledge of the modern equipment and appliances that are now available likewise will be of great advantage in securing safety for workmen and maximum output from machines at lowest possible cost, according to F. W. Richart, General Electric Co., Carterville, Ind.

Guessing at conductor size for low-voltage alternating-current circuits or calculations based on direct-current values have led to very disappointing results in practical operation. The characteristics of a.c. motors used in mining work are such that practically normal voltage must be maintained at the motors. The fact that d.c. motors continue to give fair service, even when supplied with a comparatively low voltage, has served to befog the mind of the average mining man when he first undertakes to use a.c. machines.

In most states the voltage of exposed wires is limited to 275. Users have established the voltage of a.c. motors at 220 and 440, the latter being used in but few states. The majority of manufacturers of coal-cutting machines set the minimum and maximum safe voltage for their 220-volt a.c. motors at 200 and 240, respectively. However, an open-circuit voltage of 250 is not objectionable, and one manufacturer advocates 275.

The generally accepted supply for electric power is 2,300 volts, 3 phase, 60 cycles. Two-phase motors should not be purchased, as two-phase may be converted to three-phase by manipulating the transformer connections. The power company should be consulted before buying new equipment. In practice, the supply voltage will vary anywhere from 2,200 to 2,400 and the selection of the transformer as well as the size of the low-voltage wiring will be dependent on the exact voltage delivered by the power company.

At least two standard lines of distribution transformers are available and meet with the approval of the manufacturers of mining machines. These may be operated from the ordinary commercial supply of voltage from 2,200 to 2,400. As there seems to be no serious objection to a voltage above the rated figure it seems that the standard 2,200- to 244-volt transformers usually will serve. Moreover, this type usually is stocked in warehouses and can be obtained immediately. Special transformers may be obtained when absolutely necessary. Pole-type transformers generally are used, and are furnished with hangers; oil and ordinary fuse blocks are included with those rated at 50 k.v.a. and less.

Transformers may be operated two in a bank with open-delta connections, or three in a bank with star or closed-delta, the former yielding only 87 per cent of the normal rating of the two transformers. Short-time overloading of transformers is permissible where the load fluctuates widely. Sustained overloading should not be permitted, and a device such as a thermotel should be provided to indicate the safe load limit. Good grounds and lightning arresters also are necessities.

For carrying high-voltage power down shafts or drillholes, varnished cambric, lead-covered and wire-armored cables are recommended; for horizontal runs a band steel armor is best. Bare wire usually is used for secondary installations. Weights and sizes of cables and transformer data may be obtained from manufacturers' tables or electrical hand books.

In addition to the size and resistance, reactance and power factor are sources of loss of power and must be considered in a.c. distribution systems. Reactance, which is caused by coils of wire in the circuit as well as open arcs, sets up opposition to the flow of current and, like resistance, is measured in ohms. In distribution lines it will depend upon the size and spacing of the wires of the circuit; therefore these items should be considered with this point in mind.

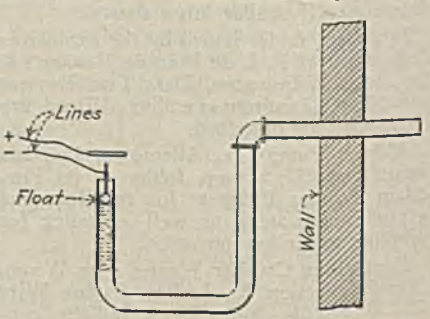
In every electric circuit supplying only induction motors the question of power factor arises. A poor power factor loads up the line with excess current, requires more copper and sometimes results in an excessive line drop in voltage. Underloaded apparatus produces low power factor and a.c. motors should be selected to operate as near their rating as possible. Capacitors, or condensers, are now available and are connected near the motor to increase line capacity. It must be understood, however, that power-factor correction is not accomplished between the capacitors and the mining machines, and for this reason the installation should be as close as possible. Large-size machine cables should therefore be used and the transformer substations kept close to the work, particularly as mining machines often cut into hard materials.

Signal Warns Engineer Of Fan Stoppage

Where the fan and driving motor is some distance away from the engineer's room, some means of signalling is necessary, according to C. E. Lively, electrician, Central Pocahontas Coal Co. At the Caples Mine of this company, Caples, W. Va., the engineer is 600 ft. away from the fan and driving motor and some means of warning him of stoppage or slowing down of the fan was deemed a necessity. As a result, the ingenious device shown in the accompanying sketch was developed.

The signal consists of a U-shaped

Tells When the Fan Stops



pipe, a cork float, suitable copper contacts and the necessary lead wires. The U-shaped pipe is placed in the wall of the fan house, the U being on the outside with the other end protruding into the intake. The U-pipe is filled almost to the open end with water and a cork in which a short bar of copper is fastened is allowed to float in the liquid in the short leg. One lead from the signal bell is attached to the copper bar. A strip of copper is fastened above the end of the copper bar and the other lead to the signal bell is attached to it. The lead wires extend to a bell in the engineer's room.

The fan operates exhausting and as long as it runs at its rated speed the water level in the short leg will be pulled down, carrying the cork and short copper bar with it. Slowing down or stopping of the fan allows the water level to rise, however, and the cork float raises the copper bar, making contact with the copper strip. The circuit is then completed and the signal bell rings, informing the engineer that the fan has slowed down or stopped.

Spare Drill Utilized To Drive Nuts

When repairing or building mine cars, the use of a power wrench for driving and tightening nuts has many advantages. The accompanying photograph shows such a machine in use at the Nellis (W. Va.) mine of the American Rolling Mill Co.

According to T. W. Blake, chief electrician, the device was made by the mine blacksmith from a spare electric coal drill and the starter gears of a Ford car. The handle that has been added supports the external gear reduction and is used as a lever to help keep the unit from turning. It is important to note that the gears are neatly and efficiently guarded.

Speeding Construction and Repairs

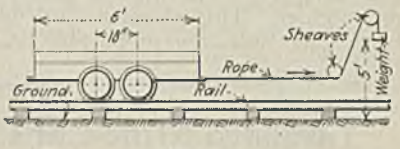
Lubrication Tests Made On the Ground

Proper lubrication frequently is left to chance, with the result that much money is wasted in additional power, lubricants and maintenance, according to Ira A. Butcher, general master mechanic, Western Coal Mining Co., Pittsburg, Kan. This company uses mine cars weighing 1,200 lb. and fitted with cast-iron wheels, cold-rolled steel axles and gun-metal bearings. Railway-car journal oil and waste were used in the original system of lubrication. This was later changed to grease and two ¾-in. diameter cast-iron balls were loosely placed on each side of the axle in each journal box, the idea being that the bumping of the cars would cause the balls to roll back and forth in the journal boxes and deposit small amounts of grease on the axles.

Complaints on the action of the cars resulted, and it developed during tests that there was no motion of the balls and, consequently, no lubrication. A 1⅛-in. diameter babbitt ball was substituted, using the same grease, resulting in an improvement in lubrication. In view of this experience it was decided to make a test of various kinds of greases and a plan was devised to compare the properties of different samples. Viscosity and body being important factors, tests were based on these properties.

Tests for body were made by bringing the lubricant to a certain temperature and dropping 1⅛- and ¾-in. diameter balls into the sample from a height of 12 in. In some greases the balls cut a clean hole with sharp edges and no surface depression while other greases showed a marked surface depression and the edges of the holes were rounded. The penetration test demonstrated that certain greases were too heavy to be considered and they were eliminated, the remainder being tested in actual service.

Cars were prepared by thoroughly cleaning the journals and filling with the lubricant to be tested. A piece of level track was chosen as the testing ground. The object was to ascertain the distance a car would run under the impulse



Elevation of Testing Apparatus

given it by a 50-lb. weight falling through a distance of 5 ft. Different greases were used in the test and the distances measured. If the car wheels happened to be out of round due to warping of the chills, it was sometimes necessary to add enough weight to start them, the extra weight being removed immediately after starting.

Each grease was tried in several cars to give representative results, and different greases gave differing lengths of travel, varying from about 10 ft. to 28 ft. A graphite grease having a comparatively light body but a high viscosity was found to give the longest travel. No scientific apparatus was necessary to make these tests, but the results enabled the management to find a grease which was suited to its purpose.

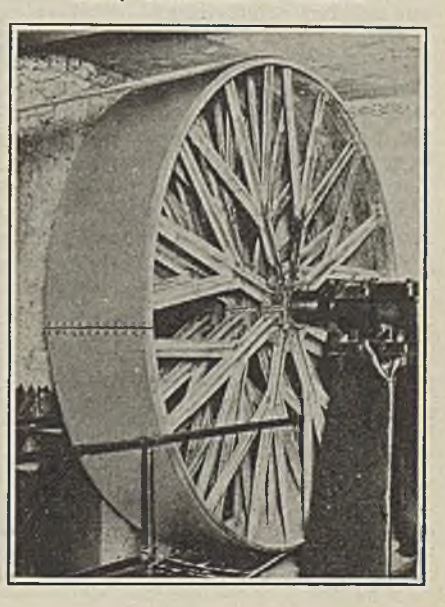
Make Your Ideas Count

If they are worth putting into effect around the mine or in the shop they are worth telling about. COAL AGE pays $5 and up for original ideas published in these pages. A photo or a rough sketch should accompany brief text.

Split Steel Fan Pulleys Excel Cast Iron

Although direct connection of fans to driving motors is favored by many mining companies, there are numerous fans of the large, comparatively slow-speed type yet in use. These are fairly efficient and good for many years of

Easily Removable if Desired



service. The illustration shows a large split steel pulley on the shaft of such a fan at a mine of the Pittsburgh Coal Co.

Using a split pulley in place of the conventional solid cast-iron wheel has many advantages. Among these might be mentioned the fact that the pulley is much lighter. This places a much less severe duty upon the supporting bearings. Again, this type of pulley can be removed, should necessity demand, in a far shorter time and with much less difficulty than could a solid wheel. Lastly, a split pulley can be used successfully with an outboard bearing whereas if a solid wheel were employed such a bearing might not be advisable.

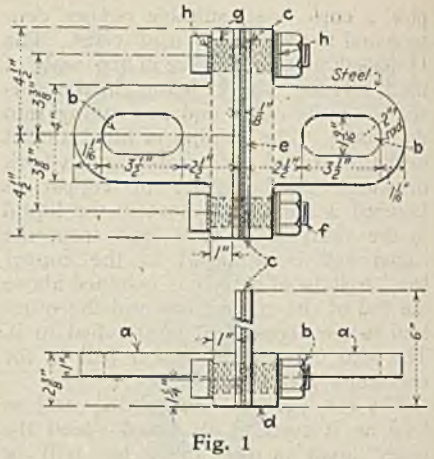


Fig. 1

Insulated Mine-Car Couplings Lessen Danger In Transporting Explosives

Transportation of explosives in mines is extremely hazardous, and where electric haulage is employed the danger is intensified. A bad bond or the use of too much motor sand occasionally causes a poor ground, and charges the locomotive frame. An electric current may then pass through the couplings and drawbars. If explosives are in an uninsulated car the current may cause the explosive to detonate, and men riding in the mine cars may be severely shocked.

Insulated mine-car couplings have been adopted by at least five companies in Alabama and Pennsylvania—and undoubtedly in other states—to prevent an electric current passing from a mine locomotive to a car or between cars joined by this coupling. Four couplings are described in a recent report by F. E. Cash and C. W. Owings, mining engineer and associate mining engineer, respectively, U. S. Bureau of Mines.

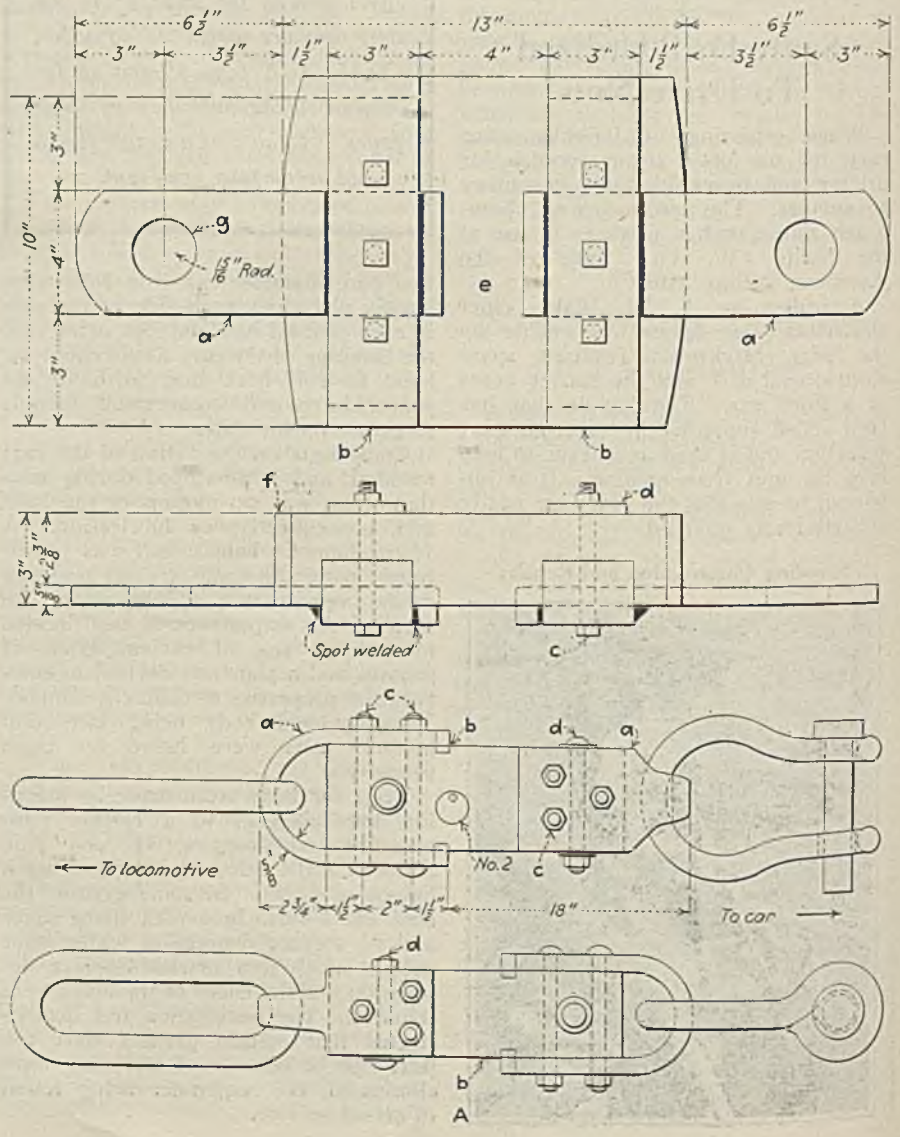
The general principles of construction are similar in all insulated couplings. The piece containing the hole for the coupling pin is made of steel and the steel parts are separated by an insulating material, such as fiber or wood. The coupling is either rigid or semi-rigid to prevent the bumpers of the mine cars from coming in contact and to keep the cars insulated from one another at all times.

Details of an insulated coupling used in Alabama and in Pennsylvania are given in Fig. 1. Two pieces of 1-in. steel (*a*), each containing a coupling-pin slot (*b*) 3½x1⅞ in., are separated by a steel and fiber plate (*c*) ⅝x6x9 in. The plate is so inserted that the top edge is flush with the top of the shoulder (*d*) of the coupling, and as the shoulder is 2⅜ in., the plate extends 3⅝ in. below the coupling. This serves to insulate the car bumpers. The plate is composed of two pieces of sheet steel ¼x6x9 in., separated by a piece of fiber (*e*) ⅛ in. thick. The two coupling pieces (*a*) are connected by 2 bolts (*f*) 1x4 in. The bolts are insulated by fiber bushings (*g*) and fiber washers (*h*).

Coupling *A* has the double advantage of insulating the coupling and providing a shield to form an insulation between the car bumpers. This coupling can be used only on cars having one-piece rounded bumpers.

A simple, effective and easily constructed insulated coupling is shown in Fig. 2. Two pieces of strap iron (*a*) ⅝x4x12 in. are each spot welded to a piece of strap iron (*b*) ⅝x3x12 in. shaped as indicated, and the ends are placed in a groove in the wooden block. Each assembled piece is fastened to a block of wood by 3 bolts (*c*) ½x5 in. The bolts pass through the wooden block (*e*) and through a steel trip (*d*) ¼x2½x9 in. The wooden block is 3x10 x11¾ in. Each end is rounded and faced with a ⅝-in. strip of steel. Three inches from the end of each steel strap a hole (*g*) 1⅞ in. in diameter is

Figs. 2 and 3



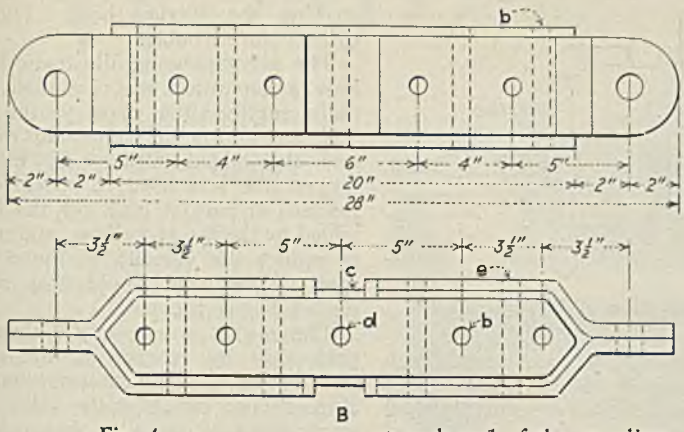


Fig. 4

provided for coupling pins. As the coupling-pin holes are 20 in. center to center and as the coupling is rigid the car bumpers are not liable to come in contact with each other.

The principle of using a wooden block as insulation in coupling *B* is applied also to the coupling shown in Fig. 3. Two pieces of steel (*a*) ⅝x3¾ in., shaped as shown, are fastened to the ends of a wooden block (*b*) by three ½-in. bolts (*c*) and by placing the ends in a groove in the wooden block. A fourth bolt (*d*) is put through the wooden block at right angles to the three bolts (*c*) to prevent splitting. The wooden block is 3¾x3¾x12 in. The steel straps (*a*) are in this case bolted on at right angles to each other to provide for the different types of clevis at each end of the coupling. The length between link and clevis is 18 in. and the over-all length is about 28 in.

A modification of coupling *C* is shown in Fig 4. Two built-up steel sections (*a*) ⅝x4 in., shaped as shown, are bolted with ⅝-in. bolts (*b*) to a wooden block (*c*) 4x4x20 in. The two strips have the ends bent and inserted into the wooden block. Five bolts (*d*) with suitable washers are placed through the block to stiffen it. The edges of the plate are ½ in. from all edges of the wooden blocks. Bolts (*e*), also ⅝ in., are used to hold these plates.

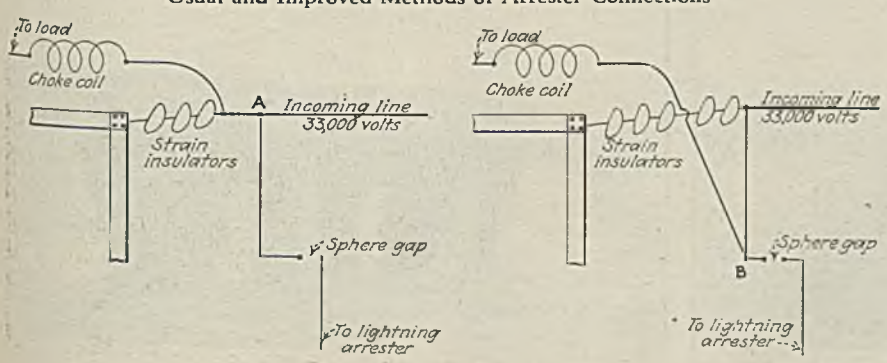
The Bureau of Mines recommends that explosives be transported in a specially constructed car or box. The insulated coupling should not supplant the insulated car but may be used as an added means of reducing transportation hazards.

Impedance of Arrester Circuit Decreased By Looping Line to Gap

THE FUNCTION of a lightning arrester is to reduce the transient voltage caused by a switching surge or by an atmospheric disturbance. The arrester reduces the voltage by draining a portion of the surge to ground. Therefore, it is important that the impedance of the circuit through the arrester from line to ground be extremely low compared to that of the line and equipment to be protected. Choke coils are placed in the load circuit to increase its impedance, and low resistance grounds are provided in the arrester circuit to decrease the impedance of the latter.

D. C. McKeehan, chief electrician, Union Pacific Coal Co., Rock Springs, Wyo., calls attention to a means of further lowering the impedance of the arrester circuit. This, as well as the common method of connection, is shown in the accompanying sketch.

Usual and Improved Methods of Arrester Connections

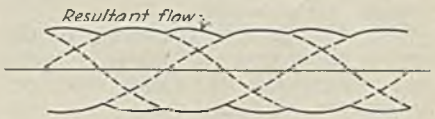


The idea is to loop the line down to the arrester spark gap instead of bringing a tap line down. The point where the surge splits onto the two circuits is then at *B* instead of at *A*. The arrester circuit is thus shortened.

There may be other complicated effects which favor the connection. Mr. McKeehan has used it for several years and, as a result, makes this comment: "The effect of this method of connection has been to greatly reduce lightning disturbances and property damage."

Lowering Power on Pump May Invite Trouble

Regarding the article "Efficiency of Plunger Pump Increased by Simple Valve in Suction Line," in the April issue of *Coal Age*, M. O. Evans, Powhatan Point, Ohio, writes: "The article does not state what kind of a plunger pump this is—whether single single-acting, single double-acting, or triplex.



Uniform Flow from Triplex Pump

To a person without experience this may be very misleading as the conditions described will not apply to all kinds of pumps and substituting a motor of half the horsepower may be only inviting trouble.

"It seems there are a good many people who do not understand why an air or vacuum chamber is used and the kind of a pump on which it must be used. In a case where long columns of water are handled in either the suction or discharge line, reversal of the pistons or starting and stopping of the water column is likely to cause water hammer in either the single single-acting or single double-acting pump.

"To overcome some of this trouble air chambers are placed on the discharge side of the pump at the highest part of the valve chest in order to hold the air, and some means must be provided for occasionally renewing air which is absorbed by the water and which is taken care of in most cases by a pet-cock or plug for this purpose. The air in the chamber acts as a cushion for the column of water and receives the excess flow from the pump, which cannot be taken care of by the discharge line. The air is compressed to a pressure greater than that caused by the column of water, and when the piston nears the end of its stroke and the flow becomes deficient the air will expand, giving up this stored water until the air pressure and that due to the column of water equalize, thereby giving a more uniform flow. This is necessary on the above single pumps.

"Because the packing does not blow or a pinion become stripped, however, does not necessarily mean that a smaller motor may be used, for raising a certain number of pounds to a required height in a specified time requires a definite horsepower regardless of how it is done. The theoretical horsepower required to pump a given amount of water equals weight of water in pounds per minute multiplied by the height pumped in feet divided by 33,000 and is entirely independent of whether an air chamber is used or not.

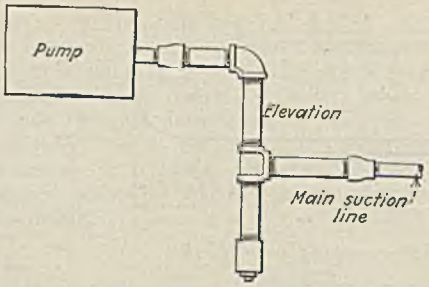
"The triplex single-acting pump presents a different problem—the accompanying sketch, taken from a pump manufacturer's catalog, shows the flow of discharge and the resultant rate of discharge without the use of an air chamber, the resultant line being fairly uniform. The three single-acting plungers are 120 deg. apart. No amount of air admitted will have an important effect on the flow horsepower output. This may be proved by using a pressure gage on this pump and filling the air chamber full of water.

"The difference in the swing of the hand in either case will not be of sufficient magnitude to cause damage; furthermore, high-pressure pumps—that is, 500 lb. or more—of the triplex type are not fitted with an air chamber, showing that it is not necessary.

"To prevent trouble, a pump used for heavy duty should be protected by a relief valve on the discharge line and a bypass valve should be installed and opened during the time of starting the pump until the motor has reached full speed, then closed slowly."

Change in Suction Line Stopped Trouble

When suction lines of gathering pumps must extend to within a few feet of the working face it is not unusual for the pumps to give trouble due to the valves becoming clogged with foreign material. Henry Villard, of Nordegg, Alberta, Canada, describes a simple change to the pump which eliminated the aggravation.



Elevation of Piping

At a mine where he was foreman each gathering pump dewatered six to eight working places and consequently had that number of branch suction lines. Coal of pea size and under made by the undercutting machines was the principal cause of the trouble. When a pump would clog and consequently fail to drain a working place, the miner would insist on pulling out the screen and shaking the suction hose. This only caused more trouble.

The accompanying illustration shows how a separator was installed in the main suction line close to the pump. The line and pump connection are 2 in. and the added fittings 2½ in. The larger size was used in order to compensate in part at least for the friction added by the tee and elbow, and in order to reduce the velocity of the water so that the fine coal would drop into the pocket below the tee.

The pocket was emptied about once each shift by unscrewing the plug at the bottom. In case material such as a chip of wood caught in the valves it was washed out by opening the pocket, removing the pump head and valves, and rocking the cylinder back and forth by hand at the same time that a bucket of water was poured into the pump. Without the pocket this would have washed the material back into the line.

Cuts Down Refuse Disposal Cost By Dump and Larry

PREVIOUS to the recent installation of a refuse damp at Zeigler No. 2 mine, Zeigler, Ill., the waste material from both No. 1 and No. 2 mines, which is loaded into self-dumping railroad cars, was dumped along the high fill which forms the gravity empty yard for No. 2 mine.

The method was objectionable because considerable man power was required to shift track and to clean under the cars so that they could be pulled out. Slides of the dumped material would at times undermine the track.

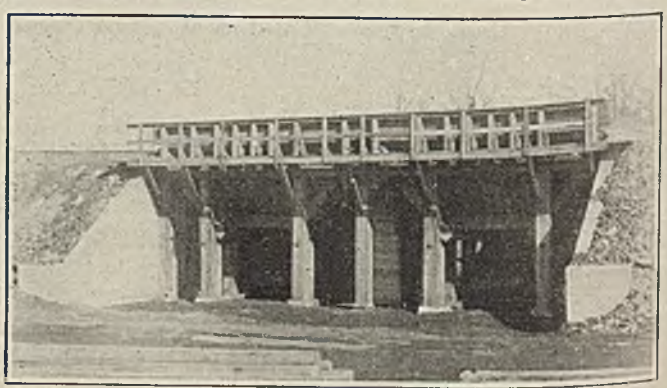
To remedy the situation a dump of length accommodating one railroad car was installed in a section of the fill of the spur track which leads to the mine-material yard and supply house. The dump is divided into two hoppers which feed onto apron conveyors 6 ft. in width. These conveyors are operated one at a time to elevate the refuse into a self-dumping electric larry. The conveyor motors are controlled by pulling ropes which are reached from the larry. One man loads, operates and dumps the larry, working but a fraction of the time to handle all of the refuse from the two mines.

The refuse is now being dumped along the base of the empty yard fill, where it prevents rather than causes slides. The saving in labor more than pays the capital charges on the increased investment.

Dump Bins, Conveyors and Larry

High Fill and Larry Dump Track

Rear View of Dump Bins



WORD *from the* FIELD

What Can Coal Do? Will Be Discussed At Carnegie Tech.

Rudolph Pawlikowski, of Germany, will be present at the Second International Conference on Bituminous Coal, at Carnegie Institute of Technology, Pittsburgh, Pa., Nov. 19-24, to describe the new pulverized-coal engine that runs on powdered combustible instead of on steam. Other German authorities on pulverized coal will be Dr. P. Rosin and I. P. Goosens. France will be represented by E. Audibert, who while he has worked on the liquefaction of coal and the formation of synthetic oils is an authority on pulverized coal and probably will choose it for his discussion.

Coal cleaning with special reference to the nature of the impurities to be removed will be treated by A. France, of Belgium, inventor of the Rhéolaveur; Dr. R. Lessing, of Great Britain; J. B. Morrow, research engineer, Pittsburgh Coal Co.; B. M. Bird, U. S. Bureau of Mines; R. H. Sweetser, American Rolling Mill Co.; H. B. Carpenter, Republic Iron & Steel Co., and F. R. Wadleigh, consulting engineer, New York. Other representatives from Germany and France will discuss this subject.

Among the more prominent men who will present papers will be A. Mailhe, professor of combustible studies at the Sorbonne, France. He is an associate of Sabatier and has made extensive studies into the action of catalysts. He probably will speak on low-temperature tars. C. Simon, of France, also will be present. He has introduced a system of storing coal gas under compression in tubes for use in the propulsion of automobiles. Dr. I. P. Goosens, of Germany, will discuss the use of tank cars for distributing pulverized coal.

Several will discuss hydrogenation. Dr. Bergius will be here once again; Dr. Carl Krauch, director, I. G. Farbenindustrie (the dye trust) will attend. He has been successful in attaining the hydrogenation of coal using lower temperatures and pressures than were formerly used. André Kling, director of the municipal laboratory of the city of Paris, and Dr. Guardabassi, of the Fabrica Coloranti Bianchi, in Italy, will discuss each his new liquefaction process.

The low-temperature distillation conferees are many—Dr. George E. K. Blythe, Dr. Cecil H. Lander, Sir Alfred Mond, Harald Nielsen, F. S. Sinnatt, of Great Britain: Antonie Vonk, Paul Weiss, Henry Lafond, Henri Winckler, of France; P. P. Kershbaum, A. Herz and Joseph Plassmann, of Germany. The last has a process of his own.

Others will discuss tars or gas, including Colonel Lindemann and E. W. Smith, of Great Britain: Raymond Beer and Jean Bing, of France; Karl Bunte and L. Edeneau, of Germany; P. E. Raaschon, of Denmark; Y. Oshima and C. Twasaki, of Japan.

Rudolph Pawlikowski

Many other subjects not otherwise classified will be considered, among them the use of coal for metallurgical purposes with Edgar C. Evans, of England, as exponent; fixed nitrogen by Georges Claude, of France; distillation of coal in vacuum by Paul Lebeau, of France; the Mont Cenis process for fixation of nitrogen by Rudolph Battig; sulphur elimination by Franz Fischer, of Germany; lignite by Fritz Frank, of Germany, and Dr. Fleissner, of Austria; synthetic rubber by Fritz Hoffman, of Germany; electrolytic process for dissociation of water, by J. E. Noeggerath, of Germany; the plan to pipe gas from the Ruhr to Berlin, a distance of about 300 miles by Dr. A. Pott, of Germany; coking temperatures by Ernest Terres, also of Germany; composition of tar by G. L. Sladnikoff, of Russia. Dr. Noeggerath was born in New York. He is working on the dissociation of oxygen from hydrogen so as to supply, if possible, the former at low cost for use in metallurgical operations.

To Hold Virginia Meet

The tenth annual first-aid contest under the auspices of the Virginia Coal Operators' Association will be held at Norton, Va., on Aug. 25. Between 20 and 30 teams will compete for trophies and merchandise valued at about $1,500.

International First-Aid Meet Elicits Wide Interest

The seventh annual International First Aid and Mine Rescue Contest, to be held at Butte, Mont., Aug. 20-22, is expected to attract 80 to 100 teams as participants, with an attendance of about twenty thousand people. Manufacturing industries as well as mining will be represented among the competing first-aid teams. In addition to prizes for the first three teams in each event all participants will be given a badge or medal indicating that they took part.

Practical problems such as might be encountered by the contestants in their daily work will be given for solution. All team members will be afforded an opportunity to examine the mine-rescue and first-aid stations, fire-fighting and ventilating equipment and safety devices used by the coal companies in the vicinity. There also will be banquets, dances and trips to points of interest for the visiting teams during their stay.

Seven Elkhorn Operations In $4,000,000 Merger

Seven going coal operations and two undeveloped leases in the Elkhorn coal field of Kentucky, valued at about $4,000,000, have been merged by the organization of the Utilities Elkhorn Coal Co., it was announced in Cincinnati, Ohio, July 25. The properties included in the consolidation are Mines Nos. 1, 2, 3, 4 and 5 of the Beaver Mining Co., the Rogers Elkhorn mine and the mine of the Furnace Mining Co. The properties are located in Knott, Pike and Floyd counties, Kentucky.

The new company has coal reserves estimated at 50,000,000 tons and its annual production is expected to be 1,000,000 tons. It is capitalized at $1,700,000. The consolidation of these properties was largely brought about by Ben E. Tate, president of the United Collieries, Inc., and C. W. Henry, formerly sales manager for the Logan County Coal Corporation but now associated with Mr. Tate in the United Collieries.

Coal Stocks and Consumption In Industry Decline

On July 1 bituminous coal stocks in industries in the United States showed a further decline of 1,000,000 tons from the preceding month. Total stocks of both anthracite and bituminous in the United States and Canada as of July 1, according to the National Association of Purchasing Agents, were slightly less than 40,000,000 tons. Consumption dropped off approximately 2½ million tons during the month of June, as com-

Paul Weir

The general superintendent of mines of the Bell & Zoller Coal & Mining Co., Chicago, was promoted to the vice-presidency of the company at a meeting of the board of directors held Aug. 1.

pared with May to approximately 32,500,000 tons, making the supply of coal on hand sufficient for 37 days, based on the current rate of consumption.

Bituminous coal production, however, dropped off in June as compared with May less than 1,000,000 tons, due to increased shipments up the lakes, which partially offset the decrease in industrial consumption. Anthracite production dropped off considerably, as retailers had stocked up prior to June 1, production being 2,800,000 tons lower than the preceding month. Since July 1 there have been further heavy cuts in stocks, particularly among utilities and railroads.

DAYS' SUPPLY OF SOFT COAL ON HAND IN VARIOUS INDUSTRIES

Byproduct coke	19
Electric utilities and coal-gas plants	67
Railroads	35
Steel mills	41
Other industries	37
Average of total stocks throughout the country	37

ESTIMATES OF OUTPUT, CONSUMPTION AND STOCKS

(In Tons)

	U. S. Production	Industrial Consumption	On Hand in Industries
August	48,907,000	33,900,000	59,697,000
September	48,592,000	33,195,000	59,179,000
October	51,400,000	35,813,000	60,154,000
November	47,100,000	35,514,000	57,940,000
December	47,309,000	37,225,000	55,725,000
January	49,645,000	37,678,000	52,909,000
February	46,933,000	36,301,000	50,595,000
March	49,452,000	38,588,000	48,388,000
April	39,081,000	35,230,000	47,432,000
May	44,748,000	34,844,000	43,670,000
June	41,264,000	32,521,000	40,890,000
July 1	.....	.....	39,855,000

Bituminous coal stocks held by railroads of the country on July 1 showed an increase of 63,405 tons over the reserves held on June 15, according to reports made to the American Railway Association. Total stocks held by the carriers on July 1 were 11,765,449 tons, consisting of 2,706,286 tons on cars and 9,059,163 tons in ground storage, as against 2,725,482 and 8,976,562 tons, respectively, a fortnight earlier.

Washington Letter

By Paul Wooton
Special Correspondent

CURRENT tendencies in the byproduct coke industry reveal the coke plant as an ally of bituminous coal in its effort to hold and expand its market. Bituminous coal, like other commodities, is experiencing the new competition, but it is not without powers of self-defense. The application of pulverized coal to the firing of ships at sea, as foreshadowed on the steamship "Mercer," is a means to recapture the profitable bunker trade of the world, so much of which has been lost to fuel oil or to Diesel-driven motor ships.

In the same way the expansion of the byproduct coke oven in the field of city gas supply offers a new outlet for coal. The coke is sold for domestic fuel and the gas often replaces water gas, a part of which is made from gas oil, the total consumption of which is equivalent to 5,000,000 tons of coal. Some of the gas produced is finding its way into the heating of houses, but while this may in rare instances displace raw bituminous coal, it is holding the market for coal, as otherwise a householder willing to pay for gas would be going to fuel oil.

A decade ago the sales of byproduct coke for household use amounted to 1,400,000 tons, a large part of which was rather inferior in quality, obtained by screening out furnace coke. In 1927, according to figures just compiled by F. G. Tryon, of the U. S. Bureau of Mines, the sales for domestic use were 4,703,000 tons. This is an increase of nearly 250 per cent.

IN comparison with 1926, when the anthracite strike stimulated sales to 5,057,000 tons, this is a slight decrease. A better standard of comparison is 1924, the last year before the anthracite shortage, when byproduct plants sold 2,800,000 tons. Preliminary indications for 1928 show that this year there will be a large increase and that the total likely will be double that of four years ago.

Most of this expansion has come through the construction of plants especially designed to furnish gas for city supply. There have been nine installations of this character in the last two years. They range from small plants to fifteen ovens at Framingham, Mass., which has a coal capacity of 47,000 tons a year, up to the 74 ovens installed by the Consolidated Gas Co. of New York, at its Hunt's Point plant, which is able to carbonize 640,000 tons of coal annually and produce 450,000 tons of coke.

According to Mr. Ramsburg, of the Koppers Co., five more plants now are under construction, including plants in the Chicago district, Montreal, New Haven, Brooklyn and Philadelphia. The Brooklyn plant will be the property of the Brooklyn Union Gas Co. and will have a coal capacity of 690,000 tons. The Philadelphia Coke Co.'s plant will have a capacity of 728,000 tons of coal, equivalent to 510,000 tons of coke. Mr. Ramsburg predicts construction of still more plants, including many small ones and a few large ones.

The Connecticut Coke Co.'s plant is especially interesting to coal men. Its 61 ovens will be producing shortly and will have a carbonizing capacity of 416,000 tons per year. Located at New Haven, it will sell gas in that city and in addition will pipe it under high pressure to surrounding towns as far as Hartford. This high-pressure transmission of gas over long distances already has been foreshadowed by American experience in the Chicago district and in northern Illinois, and by experience in Germany.

The percentage of the total supply of manufactured gas derived from byproduct ovens has increased from 11 per cent six years ago to 20 per cent and is continuing to grow rapidly. All of this is interpreted to mean more business for bituminous coal, some of which is won from its rival, oil.

William H. Weaver

Resigns as mechanical engineer for the Hazle Brook Coal Co., operating in the Pennsylvania anthracite field, to accept a position with the engineering firm of Stuart, James & Cooke in developing coal mines in Russia for the Soviet government.

Purchases Ford Mine

The Maryland New River Coal Co. has bought the mine and equipment of the Fordson Coal Co., at Nuttallburg, Fayette County, W. Va. This property adjoins that of the New River concern at Winona, W. Va., on the Keeney's Creek branch of the Chesapeake & Ohio Ry.

South Penn Buys Land

The South Penn Collieries Co. has purchased three parcels of coal land in the north end of Scranton, Pa. One was purchased from the Hudson Coal Co. and two from the Delaware & Hudson Co. The price paid for the lands was not revealed in the papers filed.

Union Abandons Jacksonville Scale; Midwest Negotiations Resumed

THE Jacksonville scale as the basis for wage negotiations in the remnants of the organized bituminous coal fields of the United States has been abandoned by the United Mine Workers. District organizations of the union have been authorized to attempt to make agreements with the operators in their territory "upon a basis mutually satisfactory." Conferences with this end in view have been resumed in Illinois and Indiana.

The decision to permit the district organizations to take independent action was announced at Indianapolis, Ind., on July 18 by International President John L. Lewis following several days' session of the international policy committee, which was called to headquarters on July 11 largely, it is said, as the result of the insistence of officers and members of district 12 (Illinois), that the situation be recanvassed.

The resolution outlining the new policy provides:

"(1) That the officers of the respective districts comprising the Central Competitive Field and the outlying bituminous districts be authorized to enter into wage negotiations with their respective operators upon a basis mutually satisfactory.

"(2) That district representatives and the officers of the international union shall co-operate in the execution of this policy.

"(3) That all district organizations be authorized to permit any coal company or any mine to employ all the men it may require for maintenance, repairs, development, construction or production of coal, providing, however, that such company agrees with the district to pay the existing wage schedules and carry out the existing agreement temporarily until a district agreement is negotiated.

"(4) That any agreement negotiated under the policy shall be submitted for ratification to a district convention or a referendum vote of the respective district."

The first district conference to get under way under the new dispensation was in Illinois. Representatives of the union and of the Coal Operators' Association of Illinois met at Chicago on July 31. W. J. Jenkins, president of the producers' organization, was made chairman of the conference; Walter Nesbit, secretary-treasurer of district 12, secretary, and C. E. McLaughlin, secretary of the operators' group, assistant secretary of the conference.

A subscale committee of nine operators and nine union representatives was named and this committee was still in session Aug. 8. It was expected, however, that the joint wage conference would receive a report the following day from the subscale committee and the smaller committee considering a new contract. The smaller committee had been deliberating over the problem since Monday when the subscale committee delegated the negotiations to it.

While there was no official information as to what the committee will report it was believed that the proposal would provide for a $6 day wage for common labor and a base pick-mining rate of 84c. per ton, against $7.50 for common labor and $1.04 for pick mining paid under the Jacksonville agreement, which the operators as a body refuse to renew.

It is believed that the wage question so far as the $6 a day and 84c. pick-mining rate is concerned has been agreed on. This is regarded as a relatively unimportant matter in the new contract. The big issue is the working agreement wherein the operators seek more control of their men.

The operators are insisting on certain rights which will permit an increase tonnage per man per day. This involves machine rates and payment for work of men in cleaning up and other duties which the union at present controls. The mine owners want the right to fire and hire their men as well as to employ the men at tasks for which the miners are best suited. It is held that such control will provide a far greater reduction in production costs than any direct reduction in wage.

Harmony prevailed throughout the deliberations and both sides seemed confident that a satisfactory agreement would be established in the end.

The still nameless organization of Indiana operators and representatives of district 11 of the United Mine Workers went into joint conference on Aug. 2 at Terre Haute. Homer Talley, chairman of the committee of operators, was made chairman of the conference, and William Mitch, secretary of district 11, secretary of the joint meetings.

Attempts of officials of district 6 to bring about a resumption of relations with the Ohio Coal Operators' Association were rebuffed by the latter organization. The union did succeed in holding a conference with four operators at Columbus, but this meeting adjourned *sine die* after the operators had refused to consider any scale which did not meet wages posted by the producers who are now running open-shop in the Buckeye State.

Leading producers in western Pennsylvania reiterate their determination to continue non-union. No official action looking toward a resumption of relations in district 2 has been reported; the general attitude of central Pennsylvania operators who parted company with the United Mine Workers last year is that they are well content to continue their present program.

As the result of a special convention of District 31, United Mine Workers, attended, it was reported, by representatives of 235 local unions, held in Fairmont, W. Va., July 26, a resolution was adopted approving the action of the international policy committee in discarding the Jacksonville wage scale as a basis for negotiations and instructing leaders in this district to make such terms as may prove to be mutually satisfactory to miners and operators.

It was stated following the convention, however, by Van A. Bittner, in charge of the northern West Virginia field, that no overtures had been made to the operators of the district so far and he indicated that the miners would await developments.

All the mines in northern West Virginia are now operated on the open-shop basis, having had no agreement with the union for some time.

Rinaldo Cappellini

As a step toward restoring harmony in district No. 1, United Mine Workers, embracing the northern anthracite region of Pennsylvania, Rinaldo Cappellini has resigned as president. He has been succeeded by John Boylan, of North Scranton. For nearly a year the district has been the scene of factional discord. Preceding his election as district president in 1923 Mr. Cappellini had the reputation of being a trouble-making radical, but on assuming office he adopted a conservative policy, which made him unpopular with the insurgent element.

A.I.M.E. Cancels Trip To Northern Mines

Because the Buchans lead, zinc and copper mine, in which the visitors would have been particularly interested because developed in accord with explorations based on geophysical methods, would not be open on the arrival of the members of the American Institute of Mining and Metallurgical Engineers, there will be no trip to Nova Scotia and Newfoundland as planned.

However, the two-day session at the Copley-Plaza Hotel, Boston, which was arranged to precede the meeting, will be held as the Institute has announced and will be in charge of the committee on geophysical methods of prospecting with a geophysical exhibit at the Massachusetts Institute of Technology and visits to that institute and Harvard College.

Two sessions on geophysics will be held followed by a subscription dinner on Aug. 30 and an all-day excursion on Aug. 31.

The following announcements are made of regional sessions: The iron and steel division will meet with the Lake Superior Mining Institute, Sept. 7, at Crystal Falls, Mich., and visit Alpha, Caspion, and Iron Mountain mines followed by a barbecue supper and a short technical session. More Iron Mountain mines will be visited Sept. 8. The meeting will conclude with luncheons at the Nightingale. This is known as the Menominee Range meeting.

A Los Angeles meeting will be held with the Western division of the American Mining Congress, Sept. 10-15, with sessions on many kinds of metal and non-metal mining problems but with no coal papers.

The institute of metals will hold its fall meeting in Philadelphia with the American Society for Steel Treating and the American Welding Society, Oct. 9-11. All sessions will be on treatment of metals, with a dinner on Wednesday.

Another meeting will be held at Tulsa, Okla., for the petroleum division, Oct. 18-19, followed by the International Petroleum Exposition, Oct. 20-29. These sessions will be on oil and gas.

Coming Meetings

International First-Aid and Mine Rescue Meet, Butte, Mont., Aug. 20-22.

Rocky Mountain Coal Mining Institute. Summer meeting, Rock Springs, Wyo., Aug. 27-29.

American Society of Mechanical Engineers. Summer meeting, St. Paul and Minneapolis, Minn., Aug. 27-30.

American Institute of Mining and Metallurgical Engineers. Fall meeting in Boston, Mass., Aug. 29-31, under auspices of Boston section.

Eleventh annual conference on Human Relations in Industry, at Silver Bay on Lake George, N. Y., Aug. 29 to Sept. 2, under auspices of industrial department of the National Council of the Young Men's Christian Associations.

National Association of Industrial Retail Store Executives. Second annual convention, Sept. 3-5, Hotel Gibson, Cincinnati, Ohio.

New York State Coal Merchants' Association. Annual convention, Sept. 13-15, at Saranac Inn, Upper Saranac, N. Y.

Second National Fuels Meeting, under the auspices of the Fuels Division of the American Society of Mechanical Engineers, Sept. 17-20, at Cleveland, Ohio.

National Safety Council. Annual meeting, Oct. 2-4, Waldorf-Astoria Hotel, New York City.

American Management Association. Autumn convention, Nov. 13-15. Palmer House, Chicago, Ill.

National Coal Association. Eleventh annual meeting, Nov. 14-16, Cleveland Hotel, Cleveland, Ohio.

Second International Conference on Bituminous Coal, Carnegie Institute of Technology, Pittsburgh, Pa., during week of Nov. 19.

Coal Mining Institute of America. Annual meeting Dec. 12, 13 and 14, at Pittsburgh, Pa.

Winners of King Shield

John Caufield (captain), Wm. Cockburn, Jos. Halle, John Parker, Jos. Graham, V. Capt.

Coal Creek Teams Win

Coal Creek teams of the Crow's Nest Pass Coal Co. Ltd., captured the chief prizes in the annual competition of the East Kootenay Mine Safety Association, held at Fernie, B. C., June 23. The six events of the day included, contests in mine rescue as well as senior, junior and first-year first-aid ladies' and open junior first-aid.

The King shield in mine rescue work was won by the Coal Creek No. 1 team and the entry from the same colliery took chief individual honors in first-aid competition. Prizes were presented by Hartley P. Wilson, general manager, after which Ed. Hesketh, president of the association, gave a short talk on the value of the meet.

London Holds Fuel Meeting

A World Power Fuel Conference will be held Sept. 24 to Oct. 6, at the Imperial Institute, London, England. A series of papers will be presented on "The Coal Industry," among which will be one on the classification of coal, by A. C. Fieldner, of the U. S. Bureau of Mines, and one of the constitution of coal, by R. V. Wheeler. A. D. Kissel will discuss the use of coal as a fertilizer.

Another section will be devoted to sampling and testing of solid fuels. Coal treatment, including cleaning, drying and briquetting, will be the subject for another section, the item of coal cleaning being set aside for J. R. Campbell, of Scottdale, Pa.

Sections are provided for discussion of (1) the storage and handling of fuels by users, (2) the carbonization industry, and (3) the composition, classification, preparation, storage and handling of gaseous fuels and of the products of the carbonization industry. In the last section a paper is to be provided on solid smokeless fuels as substitutes for anthracite, produced either by high- or low-temperature carbonization. This has been assigned to F. G. Tryon, of the U. S. Bureau of Mines.

Utilization of fuels, (1) in steam generation and the production of electricity, (2) in generating electricity for industrial furnace work, and (3) in generating electricity for domestic purposes, will be discussed each by a separate section.

Powdered fuel, which is to be considered by another section of the conference, will have one paper by H. W. Brooks, of Fullerton, Pa., on its application to the marine field, another by Henry Kreisinger, of New York City, on the steam engineering field, and a third by W. O. Renkin, of Fullerton, Pa., on its relation to metallurgy.

Industrial Relations Meeting At Silver Bay

Human relations in industry is the central theme about which the program has been built for the eleventh annual conference of the industrial department of the National Council of the Y. M. C. A., to be held at Silver Bay on Lake George, N. Y., Aug. 29-Sept. 2, 1928.

"Labor and Leisure," "Increasingly Vital Relationships Between College and Industry," "Safeguarding the Worker's Income" and "Budgeting as a Means of Regularizing Employment" are a few of the major topics that will be discussed by P. W. Wilson, former member of the British Parliament; Prof. Michael Pupin, Columbia University, New York; W. J. Graham, vice-president Equitable Assurance Society; Howard Coonley, president Walworth Co., Boston, Mass.; C. J. Hicks, assistant to the president, Standard Oil Co. of N. J., and Edward R. Stettinius, Jr., General Motors Corporation.

Obituary

FRANCIS B. WOOD, president of the Seaboard Coal Corporation, with executive offices in the Woolworth Building, New York City, died on Aug. 2 following an operation. The corporation's mine is located at Cottondale, Ala.

WILLIAM EVANS GUY, 84 years old, retired mining and civil engineer and railroad builder, died at Imogene Bassett Hospital, Cooperstown, N. Y., July 24. Death was due to the infirmities of old age and followed an illness of two weeks. He helped organize the Madison Coal Corporation, Chicago. He retired in 1913.

RUFUS C. PHILLIPS, 63 years old, secretary of the American Rolling Mill Co., a brother-in-law of George M. Verity, president of the concern, and prominent in civic and industrial circles, died at a hospital in Middletown, Ohio, July 11, following several weeks of illness.

Allow Rate Rise to Lakes From Southern Fields

Disregarding the protests of coal interests, the Interstate Commerce Commission on Aug. 7 announced that it would permit the new rates of Southern carriers increasing charges on lake-cargo coal 10c. to become effective on Aug. 15, "in view of the situation created by the injunction entered by the District Court of the United States for the Southern District of West Virginia."

The higher rates, agreed upon several weeks ago by the executives of the Northern and Southern carriers as a compromise solution of the fight over the lake adjustment, will have the effect of narrowing the differential between the Northern and Southern coal fields from 45c. to 35c. per ton. Prior to the last decision of the Interstate Commerce Commission in the matter the differential was 25c.

When the Southern roads sought to restore the 25c. differential the Commission ordered the cancelation of the tariffs and this order was enjoined by the federal district court. Subsequently the Northern lines filed tariffs providing for a refund of 20c. per ton on lake coal, thus re-establishing the basis contemplated by the Commission.

The Southern tariffs, however, will not change the rate situation this season, because they provide that a refund of 10c. will be made on lake tonnage moving under them prior to Dec. 31, 1928. On that day the rebate provision of the Northern tariffs also expires, making possible the 35c. differential.

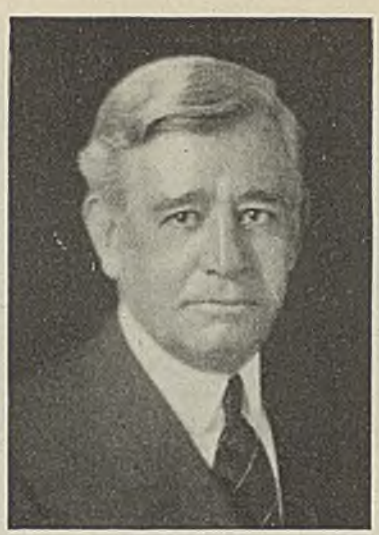
Extension of the 45c. differential this season to points on the Detroit and St. Clair rivers by the Bessemer & Lake Erie R.R. has been allowed despite the protests of other Northern lines which pointed out that they had restricted the application of their rebate provisions to coal going beyond Port Huron, Mich., and Sarnia, Ont., to prevent cross-hauling between Lake Erie ports.

The Commission will continue to contest the injunction issued by the District Court for the Southern District of West Virginia. Luther M. Walter, of Chicago, has been appointed special counsel to represent the Commission before the Supreme Court.

Rocky Mountain Institute Plans 3-Day Meeting

"Something for everyone" is promised those attending the annual summer meeting of the Rocky Mountain Coal Mining Institute, to be held at Rock Springs, Wyo., Aug. 27, 28 and 29. Guests will be entertained with a banquet and a dance as well as trips to points of interest nearby.

Mechanical mining, rock-tunnel driving, safety and a choice of three inspection trips will feature the business meetings. In addition there will be a motion picture of coal mining in Russia, and a thorough discussion of the human factor in management and mining.



Morton L. Gould

Long prominent in the bituminous coal industry as president of the Linton Coal Co., with a mine at Linton, Ind., Mr. Gould has sold out to the Little Betty Mining Co., with offices in Chicago. Mr. Gould will devote his attention to his other business interests.

Producers and Retailers Seek Closer Relations

Milton E. Robinson, Jr., Chicago, president of the National Retail Coal Merchants' Association, has reappointed Hiram Blauvelt as chairman of the public relations committee of the association. Mr. Blauvelt is vice-president of the Comfort Coal-Lumber Co., Hackensack, N. J. Harry Turner, president, Harry Turner Coal Co., Topeka, Kan., will be vice-chairman.

H. A. Glover, vice-president, Knox Consolidated Coal Co., and chairman of the marketing committee of the National Coal Association, conferred late in July with Mr. Robinson and Frank E. Carey, chairman of the trade relations committee of the retailers' association, on the matter of proper points of contact between the two associations. It was agreed that in many respects their interests were identical and that it would be advantageous to cultivate closer relations. Mr. Glover pledged the individual efforts of the marketing committee and the officers of the National Coal Association toward this end.

Hoover to Get Seaman Medal

In recognition of his "great public service from the standpoint of human values," and particularly for his "conspicuous work in the Mississippi flood relief," Herbert Hoover has been awarded for 1927 the Major Surgeon Louis Livingston Seaman medal by the American Museum of safety. This medal, as expressed by its donor, Major Seaman, is "for the best record in the saving of life in the field of sanitation and accidents," and was awarded Mr. Hoover for his efforts in reconstruction work in the war and post-war periods, as well as in the Mississippi flood relief.

Reductions Ordered in Rates To Northern New York

Reductions of 10 to 59c. per gross ton in the rates on bituminous coal from the Clearfield district and groups differentially adjusted thereto and of 11c. to 52c. on the steam sizes of anthracite to destinations in northern New York have been ordered by the Interstate Commerce Commission in *International Paper Co. vs. Buffalo, Rochester & Pittsburgh Ry. Co. et al.* and related cases. The railroads are given until Oct. 10 to establish the new rates.

The bituminous rates under attack, the reductions sought by the various complainants and the rates ordered by the Commission are shown in the table following:

From Clearfield District to—	Rates in Cents per Gross Ton Present	Proposed	Ordered
Black River	334	278	324
Brownville	334	278	324
Carthage	334	278	324
Watertown	334	278	324
Dexter	334	278	324
Evans Mills	334	278	324
Felts Mills	334	278	324
Great Bend	334	278	324
Syracuse	296	265	285
Solvay	296	265	285
Oswego	309	278	298
Piercefield	435	291	376
Hornell*	259	...	249
Corning	284	...	259
	271	...	259
Ithaca	296	265	285
Canisteo*	259	...	249
Hammondsport	296	...	285
Penn Yan	296	...	285
Dundee	284	...	272
Montour Falls	284	...	272
Geneva	296	...	285
Binghamton	296	...	285
Glens Falls	372	335	355
Corinth	410	335	355
Fort Edward	372	335	355
Ticonderoga	435	335	383
Hudson Falls	372	335	355
Willsboro	433	367	397

*Reduction applies from mines on B. R. & P., B. & S., P. S. & N. and P. & S. taking $2.72 rate and from P. R.R. mines via Elmira to Canisteo and Hornell.

Holding that the rates involved were adjustments really part of the Commission's general inquiries and previous orders in anthracite and Eastern bituminous charges, the present decision denies reparation to the complainants. The present order also dismisses allegations of unreasonableness against rates to Antwerp, Canton, Deferiets, Harrisville, Lyons Falls, Norfolk, Norwood, Raymondville, Dansville, Silver Springs, Perry, Horseshead and Elmira.

In those portions of the complaints involving steam sizes (No. 2 buckwheat and smaller) of anthracite, attack was made on rates of $2.77 per gross ton to Glens Falls, Corinth and Fort Edward, $2.90 for D. & H. and $3.03 for Ticonderoga R.R. delivery at Ticonderoga, $3.53 to Piercefield and $3.02 to Willsboro. Complainants sought rates of $2.40, $2.53, $2.53, $2.65 and $2.65, respectively.

The Commission ordered the establishment of rates of $2.54 to Glens Falls, Corinth and Fort Edward, $2.79 to Ticonderoga, $3.01 on coal from mines in the Wyoming region on the D. & H., N. Y. O. & W., D. L. & W. and L. & W. V. via short lines to Piercefield and $3.20 via other routes and from other parts of the anthracite region and $2.92 to Willisboro. Reductions also

were ordered on other sizes of anthracite to Willsboro.

In the related case of *G. H. Treyz & Co. et al. vs. Baltimore & Ohio R.R. Co. et al.* the Commission ordered rates on bituminous coal to Corbett and the Livingston Manor group cut from $3.72 per gross ton to $3.22 to Corbett and $3.09 to the Livingston Manor points, viz., Trout Brook, Hortons, Cooks Falls, Roscoe and Livingston Manor. The same decision reduces rates on steam sizes of anthracite to the Livingston Manor group from $2.02 to $1.89.

Changes in Soft-Coal Rates To Capital Suspended

Tariffs making both advances and reductions in bituminous rates from West Virginia to Washington, D. C., and adjacent points have been suspended by the Interstate Commerce Commission from Aug. 10, 1928, to March 10, 1929. The advances under attack include proposed increases of 29c. from the New River and Pocahontas districts to the Capitol City. A hearing will be held in Washington on Sept. 26 before Examiner Curtis. The proposed changes were the outgrowth of the recent decision of the Commission in *Potomac Electric Power Co. et al. vs. Chesapeake & Ohio Ry. Co. et al.*

Protests against the higher rates were made by coal operators' associations of southern West Virginia. Spokesmen for these interests pointed out that the Southern roads were increasing their rates from $2.84 to $3.13 at the same time the Pennsylvania R.R. was cutting the rate from competing Northern mines from $2.84 to $2.71 in compliance with the decision of the Commission in *Eastern Bituminous Rates*, 140 I. C. C. 315.

Connecticut Attacks Rates

Freight rates on both anthracite and bituminous coal from New London and other Connecticut ports, Rhode Island and Massachusetts ports to interior points in Connecticut, Massachusetts, Vermont and New Hampshire are attacked as unreasonable in a complaint filed with the Interstate Commerce Commission by the State of Connecticut. The complaint puts in issue both line-haul rates and transfer charges.

Favors New Youngstown Line

Approval of the application of the Pittsburgh, Lisbon & Western R.R. to construct branch lines which would establish a through route for the transportation of coal from the Connellsville and Pittsburgh districts via the Lisbon and Montour railroads is recommended to the Interstate Commerce Commission by C. V. Burnside, assistant director of the Commission's bureau of finance. Mr. Burnside also recommends control of the Lisbon, the capital stock of which was recently acquired by the Pittsburgh Coal Co., by the Montour R.R. The last-named line also is a subsidiary of the coal company. The request of the Lisbon to retain excess earnings, however, should be denied, in the opinion of the assistant director.

Cranberry Lifts the Cover

Roads to Tap New Acreage In Guyandot Valley

The Virginian & Western Ry. Co., a subsidiary of the Virginian, has been authorized to construct a line of railroad in Wyoming and Mingo counties, West Virginia, from a connection with the Guyandot River branch of the parent company at or near Itmann to a connection with the Chesapeake & Chio Ry. at or near Gilbert, a distance of 40.6 miles. The Guyandot & Tug River R.R. Co., a subsidiary of the Norfolk & Western, has been authorized to build a line from Gilbert to Wharncliffe, a distance of 10.5 miles.

Certificates of convenience and necessity issued by the Interstate Commerce Commission are granted on condition that construction shall commence not later than Jan. 1, 1929, and be completed on or before Dec. 31, 1931. Applications of the Guyandot & Tug River to build from Elmore to Gilbert and of the Chesapeake & Ohio to build from Gilbert to Mullens and from Stonecoal to Mullens were denied.

The territory between Itmann and Gilbert is estimated to contain about 330 square miles, nearly all underlaid with coal. Estimates of the coal commercially mineable and recoverable range from 560,000,000 to 1,444,000,000 net tons, much of it low-volatile. The territory also contains upward of 355,000,000 feet b.m. of timber, most of which is hardwood.

Rainey Buys Clyde Coal Co.

W. J. Rainey, Inc., leading independent coke producer in the Connellsville (Pa.) region, has purchased the Clyde Coal Co. properties at Fredericktown, Washington County, Pa., according to an announcement Aug. 2 by James Neale, president of the Clyde company. Tipples, machinery, miners' houses and accumulated coal were included in the transaction. The mine has a daily production capacity of 2,000 tons. The consideration was not revealed.

Strip Operation Sets Off Mighty Blast

A record dynamite blast was discharged at the Cranberry stripping operation of the Lehigh Coal & Navigation Co., near Hazleton, Pa., July 25, when 200,000 cu.yd. of earth was loosened by a single discharge of 100,000 lb. of dynamite. The explosive was placed in 128 holes, each 6 in. in diameter, and driven to a depth of about 80 ft.

Several weeks was spent in drilling the holes and preparing for the blast. When the electric spark was applied there was a muffled roar and a puff of smoke arose into the air, to be followed immediately by a dense cloud of earth, gravel and rock, which soared to a height of several hundred feet.

Eureka Mine Property Burns

The ground structure and machinery of Eureka Mine No. 2, at Clarmin, Ill., were destroyed by fire early on July 28. The loss was estimated at approximately $20,000. The mine, which had been idle for several months, is owned by Jones Brothers Coal Co. Recently the owners installed new machinery and had planned to resume operations in the near future. The mine when working employed 200 men.

Bankhead Washery Completed

The Consolidated Coal Co. has just placed in operation its large washery at Bankhead mine, Walker County, Alabama, the last unit of an improvement schedule on which about $250,000 was expended. A preparation plant was completed a short time ago and additional equipment was placed in the mines to bring about and facilitate the handling of an increased production. The daily output is now 1,750 tons, which can be increased to 2,500 when trade requirements warrant.

The washery and preparation plant were designed by Allen & Garcia, Chicago, and erected under the supervision of its engineers. R. T. Daniel, Birmingham, is president of the company and P. R. Jordan, vice-president in charge of operations at the mine.

Denies Special Treatment To Illinois Field

An echo of the old conflict between the Interstate Commerce Commission and the state authorities of Illinois on the adjustment of intrastate coal rates was heard in the recent decision of the federal body refusing to modify its order of Jan. 11, 1921, in *Illinois Freight Rates* to give the Fulton-Peoria district the benefit of lower rates on shipments made between that date and April 18, 1922.

When the Commission in the summer of 1920 authorized a general increase of 40 per cent, the Illinois Public Service Commission limited the advance in intrastate rates to 33⅓ per cent and subsequently established distance scales yielding less than 33⅓ per cent. Upon appeal to the federal commission an order directing the 40 per cent increase was entered and later orders of the state commission were enjoined. Still later the Illinois commission vacated its previous orders and approved the increases authorized by the federal board.

In 1923 the Illinois commission found rates to Canton, Peoria and Galesburg from Aug. 28, 1920, to June 30, 1922, unreasonable, and ordered reductions approximating 10 per cent. Reparation was paid on all shipments moving at the rates condemned except during the period Jan. 11, 1921, to April 18, 1922. By refusing to except this traffic from the application of the general findings in the *Illinois Freight Rates,* the Commission relieves the carriers of the obligation of paying reparation.

Organize Marketing Plan

Fifteen shaft and slope mines in the Arkansas anthracite field have organized the Arkansas Anthracite Producers' Association and subscribed a fund of $15,000 to advertise and develop the St. Louis City and St. Louis County (Mo.) market. E. J. Wallace, president, Wallace Coal Co., St. Louis, has been appointed executive director in charge of the work.

The coal will be marketed through a selected list of retailers. The advertising, selling, invoicing, etc., will all be in the name of the association. Coal will be sold on a guaranteed satisfaction basis.

Will Test Pulverized Coal

Following the experiments with the "Mercer" by the U. S. Shipping Board, W. C. Bridgeman, First Lord of the Admiralty, recently stated in the British Parliament that the sloop "Hollyhock," a small obsolete battleship, had been offered for experiments in the use of pulverized fuel and these tests would doubtless be made by the Department of Scientific and Industrial Research. He added that coal was used in preference to oil for all services in which its use would not decrease the efficiency of the fleet.

John C. Brydon

Appointed general superintendent of the Pennsylvania Coal Co. He succeeds Joseph Jennings, who recently resigned, in charge of all collieries of the Pennsylvania company as well as those of its subsidiaries, the Hillside Coal & Iron Co. and the Blossburg Coal Co. Mr. Brydon formerly was president of the Quemahoning Creek Coal Co., which he organized, and also was head of the National Coal Association. More recently he was associated with the Baltimore & Ohio R.R.

Urges Increased Premium

Increase in the workmen's compensation premiums paid by West Virginia coal operators will be necessary, according to a statement by Commissioner Heaberlin. The commissioner pointed out that when the basic rate of $1.75 was in effect between 1923 and 1925 the fund fell behind and an obligation of $5,000,000 was accumulated. In 1925 the rate was increased to $2.10, which just about meets present requirements. A rate of $3 to $3.75 has been proposed by Commissioner Heaberlin to the operators, to be maintained for the next five to ten years with a view to stabilizing the fund.

Superior Breaker Burns

A loss of $75,000 was caused on July 19, when fire destroyed the breaker and other buildings of the Superior Anthracite Coal Co. at Carbondale, Pa. This mine was to have been sold a few days before the fire to the Notelling interests, of New York City. It has been operated for some time by New York and Scranton interests.

To Study Pulverized Coal

The government of British Columbia has appropriated $12,000 for an investigation into the practicability of the use of pulverized coal for small steamships. The investigation will be carried out in co-operation with the Pacific Navigation Co., which will be given assistance to install the necessary plant in one of its boats.

Planning for Safety Day In West Virginia

Arrangements are rapidly being perfected for the West Virginia Safety Day, to be celebrated in Bluefield on Sept. 22. Robert M. Lambie, head of the State Department of Mines, has announced that Robert Lilly, of the staff of the department, is to be the director of the meet in charge of all plans. He will be assisted by W. E. E. Koepler, secretary of the Pocahontas Operators' Association, as supervising director. It is estimated that between 25,000 and 45,000 people will attend the safety day meeting.

It has been announced that all mines in the Pocahontas, Tug River, Williamson, Clinch Valley, Winding Gulf, New River, Kanawha, Logan and northern West Virginia fields will be closed on the day of the safety meeting and that teams from all those districts will participate in the meet.

It is proposed to build a temporary structure at the grounds in order to accommodate the crowd. The teams will parade through the business section of the city prior to the opening of the exercises at the field.

Safety Council Completes Mining Section Program

Technical sessions, luncheons and other entertainment will feature the annual meeting of the National Safety Council Oct. 2, 3 and 4. The sessions will be held in the Waldorf-Astoria Hotel, New York City.

The mining section program will include papers on "Safety Pays," by Howard Young, vice-president, American Zinc, Lead & Smelting Co.; "Methods and Results of Improved Foremanship Conferences," by H. A. Gilbertson, director of personnel, Lehigh Coal & Navigation Co.; "Educating the Miner," by Cleveland E. Dodge, vice-president, Phelps Dodge Corporation; "Safe Handling of Explosives Underground," by S. P. Howell, explosives engineer, U. S. Bureau of Mines, Pittsburgh, Pa.; "Safety, a Common Denominator in the Coal and Metal Industries," by D. D. Muir, vice-president, United States Fuel Co.; "The Management Believes in Accident Prevention" and "Fires in Metal Mines—Causes, Preventions and Methods of Handling," speakers to be announced.

Joy Creditors Satisfied

Officers, directors and the creditors' committee of the Joy Mfg. Co. met at Franklin, Pa., July 26 to dissolve the creditors' committee and reorganize the board of directors. The company got into financial difficulties, having an indebtedness of $500,000, early in 1925, when it was necessary to mortgage the property and issue bonds to the creditors for their claims. This entire indebtedness has been paid, the mortgage satisfied and the company has been

working at normal capacity for over two years. John A. Donaldson is president of the company; Wm. E. Barrow, vice-president, and Walter M. Dake, consulting engineer in charge of sales.

Gas Line Franchise Grant Worries Utah Coal Men

Despite strenuous protest of coal men, coal railroads, utility companies and others the Ogden (Utah) City Commission has granted the Ohio Oil Co. and allied interests a franchise to pipe natural gas from Wyoming into that city for industrial and domestic purposes. The gas interests contended they could save the people of this valley a million dollars a year besides eliminating the smoke nuisance and thereby improving health conditions. The company expects to spend $18,000,000 to $20,000,000 to pipe gas into Utah. Several small communities have granted similar franchises.

Salt Lake City has not committed itself as yet, but the City Commissioners are holding private conferences daily with representatives of the conflicting interests. The gas company contends that as Utah's coal mines ship much coal outside the state the new source of fuel would not destroy this industry and that in any case the availability of natural gas would bring other large industries to Utah.

Coal Cleaning Corporation Wins Patent Suit

Plaintiffs in the suit of Sutton, Steele & Steele and the American Coal Cleaning Corporation against the Gulf Smokeless Coal Co. and Roberts & Schaefer for alleged infringement of patent rights covering the pneumatic process for cleaning coal were sustained in a decree handed down July 20 by Judge George W. McClintic in the U. S. Court for the Southern District of West Virginia at Charleston. An injunction with damages was awarded. The court granted the defendants an appeal to the Circuit Court at Richmond.

Fuel Course in Second Year

The fuel engineering course at the Towne Scientific School, University of Pennsylvania, Philadelphia, Pa., offering comprehensive, practical instruction, will open its second year Oct. 1, 1928.

Pittsburgh Coal Tops Record

The Pittsburgh Coal Co. broke all records for weekly output in the three years of open-shop production in the week ended July 28 by producing 215,625 tons with an average of 8,248 men at work. In the preceding week a new record had been established of 203,670 tons, with an average of 8,016 men at work.

National Fuels Conference Set For Cleveland

The second National Fuels Conference held under the auspices of the fuels division of the A.S.M.E. will meet at Cleveland, Ohio, Sept. 17-20. In addition to general sessions sectional meetings will be held on fuel characteristics, industrial consumption, marine firing, power-plant developments, pulverized fuel; railroad fuel and smoke abatement. Dr. Thomas T. Baker, president, Carnegie Institute of Technology, will open the conference.

Among the speakers at the various sessions will be: F. R. Wadleigh, former U. S. Fuel Distributor; H. D. Smith, assistant to the president, Majestic Collieries Co.; A. C. Fieldner, U. S. Bureau of Mines; Henry Kreisinger, Combustion Engineering Corporation; W. E. Rice, U. S. Bureau of Mines; H. C. Weaver, University of Texas; E. H. Tenney, Union Electric Light & Power Co.; E. G. Bailey, Fuller-Lehigh Co.; John C. Crawford, Chicago, Burlington & Quincy R.R.; Malcolm McFarlane, New York Central, and W. J. Overmire, Cleveland, Cincinnati, Chicago & St. Louis, Ry.

Costanzo Buys Richland Mine

Frank Costanzo, president of the Costanzo Coal Co., operating at Warwood, near Wheeling, W. Va., has purchased the mine of the Richland Coal Co. from the Philadelphia-Delaware Finance Co. The latter company obtained possession of the mine when it and other properties of the late J. C. McKinley, long involved in bankruptcy proceedings and in litigation, were sold under the hammer at the direction of the U. S. Court for the Northern District of West Virginia.

Large Strip Tract Sold

Seven hundred acres of strip coal land near Hollidayboro, Ill., comprising the entire holdings of the Forsyth Coal Co., was purchased last week by the Truax-Traer Coal Co., Minot, N. D. The purchaser owns a large development in North Dakota.

Charleroi Mine Reopens

The Youghiogheny & Ohio Coal Co. has resumed operations at the Charleroi mine, in Washington County, Pa., after an idleness of nearly eighteen months. It will run open-shop with between 400 and 500 men.

Parker Run Mine Resumes

Operations were resumed last week at the Parker Run mine of the Monongahela Fuel Co., Rivesville, W. Va. The plant had been shut down since Dec. 5, 1927.

Baker Quits Terminal Co.; Downey Acting Head

Horace F. Baker resigned as president and chairman of the board of directors of the Pittsburgh Terminal Coal Corporation, it was announced July 23. Ill-health was given as the reason for his retirement. He will continue, however, as legal adviser of the company. G. Faber Downey, Jr., assumed office as acting president Aug. 1.

On taking up his new position Mr. Downey issued a statement regarding the company's attitude toward the United Mine Workers. "We are working on a non-union basis," he said, "and will continue on this basis. We have no intention of forcing the men who worked for us while there was a strike to join the union or seek employment elsewhere. We are giving our men steady work and will do so, but strictly non-union."

Personal Notes

General Edward O'Toole, general superintendent of the West Virginia operations of the United States Coal & Coke Co., left Welch, W. Va., July 28 on combined business and pleasure trip around the world. Embarking at San Francisco Aug. 11, he will be gone about four months, visiting Australia, Japan, China and most of the European countries. In the course of his travels he will inspect a number of plants installed by the American Coal Cleaning Corporation, of which he was the organizer.

H. E. Bell, president of the Bell & Zoller Coal & Mining Co., Chicago, was elected to the newly created office of chairman of the board at a meeting of directors of the company held Aug. 1. G. D. Cowin, formerly vice-president, was made president.

M. A. Rolfe, formerly president of the Black Gem Coal & Coke Co., Chicago, joined the sales staff of the Republic Coal & Coke Co. Aug. 1.

William J. Shearn, who was associated with the Pratt Brothers mining interests in southern Illinois for a number of years, has left for Alaska to investigate coal lands for Pacific coast financial interests.

B. J. Matteson has retired as industrial relations executive of the Colorado Fuel & Iron Co. under the provisions of the company's service retirement plan. He has been succeeded by J. F. Chapman, with M. M. Watson as assistant.

L. C. Brunswick and Martin Gallagher, formerly division superintendents with the Hanna Co., have joined the staff of the Pennsylvania Coal Co. in Scranton, Pa.

Joseph J. Ardigo, formerly assistant to George Bausewine, Jr., who recently resigned as secretary of the Operators' Association of the Williamson Field, has been appointed acting secretary by the executive committee of the association.

E. E. Scholey, of Marion, Ohio, has been appointed superintendent of the United Electric Coal Cos. at Duquoin, Ill. He succeeds G. M. Fairfield.

Fatalities From Coal Mine Accidents Decline During June

Accidents at all coal mines in the United States during June, 1928, caused the death of 135 men, according to the U. S. Bureau of Mines. Thirty-two of this number were killed in the anthracite mines of Pennsylvania; the remaining 103 deaths occurred in bituminous mines in various states. The death rate per million tons of coal mined during the month was 3.27, based on a production of 41,264,000 tons of coal, as compared with 3.92 for June, 1927, based on 172 deaths and 43,884,000 tons of coal.

The rate for bituminous mines alone for June, 1928, was 2.86, with a production of 35,963,000 tons, and that for anthracite mines was 6.04 with a tonnage of 5,301,000, as compared with 3.22 and 7.44, respectively, for June of last year, based on an output of 36,627,000 tons and 118 deaths, and 7,257,000 tons and 54 deaths. Compared with May, 1928, the rate for June of the present year was much lower as four major explosions occurred in May and caused the death of 230 men, whereas only one major disaster occurred in June with a loss of only 6 lives.

During the first six months of 1928 accidents at coal mines caused the loss of 1,128 lives. The production of coal during this period was 271,392,000 tons, showing a death rate of 4.16 per million tons as against 3.86 for the same six months of 1927, based on 1,225 fatalities and 317,526,000 tons of coal. The record for bituminous coal alone from January to June, 1928, was 901 deaths and 234,289,000 tons with a fatality rate of 3.85; while that for anthracite showed 227 deaths, 37,103,000 tons and a death rate of 6.12. The same period for 1927 showed 947 deaths in bituminous mines, 276,629,000 tons and a death rate of 3.42; for anthracite the record was 278 fatalities, 40,897,000 tons and a fatality rate of 6.80. The industry as a whole had 1,225 deaths, 317,526,000 tons and a death rate of 3.86 during the first half of 1927.

Only one major disaster—that is, one in which five or more lives are lost—occurred during June, 1928. This was an explosion at National, W. Va., on June 20, which caused the death of 6 men. This accident, together with eight similar disasters in the period from January to June, brings the total loss of life from major disasters in 1928 to 290. In the corresponding period of last year there were seven major disasters which caused 140 deaths.

Comparison of the accident record by causes for the first six months of 1928 with that for the same period of 1927 follows:

	Year, 1927	Jan.-June, 1927	Jan.-June, 1928
All causes	3.704	3.858	4.156
Falls of roof and coal	1.907	1.849	1.806
Haulage	0.586	0.602	0.564
Gas or dust explosions:			
Local explosions	0.153	0.176	0.096
Major explosions	0.258	0.400	1.068
Explosives	0.183	0.195	0.147
Electricity	0.167	0.151	0.147
Other causes	0.450	0.485	0.328

Benito Quinquela Martin

No idle visionary is this Argentine painter, one of whose canvases is reproduced as a frontispiece in this issue of "Coal Age." A foundling adopted by people engaged in the coal business in a small way, his early years were spent as a lighterman carrying coal to and from vessels in the Port of Buenos Aires. This was his lot until the age of 22, when he was enabled to give undivided attention to art through the friendly interest of the Argentine Director of Fine Arts, who had seen some of his earliest work in charcoal on the walls.

Coal-Mine Fatalities During June, 1928, 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.	1928	1927
Alabama	1		1				3					5													5	5
Alaska																									0	0
Arkansas			1	1								2													2	1
Colorado	3		1									4													4	3
Illinois	3											3										1	1	2	4	0
Indiana																									0	2
Iowa																									0	0
Kansas	2											2													2	1
Kentucky	3		1				1					5													5	9
Maryland																									0	1
Michigan																									0	0
Missouri																						1	1	2	1	0
Montana																		1					1	1	1	2
New Mexico																									0	3
North Dakota			1									1													1	0
Ohio	5		1		2							8													8	3
Oklahoma																									0	2
Pennsylvania (bituminous)	11	1	5				1				1	19													19	27
South Dakota																									0	0
Tennessee																									0	0
Texas			1									1													1	0
Utah																									0	2
Virginia	2		2									4													4	1
Washington				1								1													1	1
West Virginia	20	3	9	6	3		2					43													43	53
Wyoming	2											2													2	2
Total (bituminous)	52	4	23	8	5		7				1	100						1					2	3	103	118
Pennsylvania (anthracite)	11	10	3	1	1	1	1				2	30	1				1					1		1	32	54
Total, June, 1928	63	14	26	9	6	1	8				3	130	1				1	1				1	2	4	135	
Total, June, 1927	84	13	18	12	13	2	7		3		7	159			1		1	2	4	1		1	4	12		172

Current Prices of Mining Supplies

SINCE LAST MONTH

CAST-IRON pipe rose $1 per ton at Birmingham, following a similar advance in July. This increase necessarily affects f.o.b. points supplied by the Birmingham market. Another important price advance of the month is that of 1c. per sq.yd. in brattice cloth, affecting Eastern and Mid-western markets. All of the other mining supplies listed, held firmly to quoted levels with the exception of scrap metals. Heavy melting steel at New York is 50c. per ton below the July price. Lower prices are also being paid by dealers for scrap copper and brass.

STEEL RAILS—The following quotations are per gross ton, f.o.b., in large mill lots:

	Pittsburgh	Birmingham	Chicago
Standard Bessemer rails	$43.00	$43.00	$43.00
Standard open-hearth rails	43.00	43.00	43.00
Light rails, 25 to 45 lb	36.00	34@36	36@38

TRACK SUPPLIES—The following prices are base per 100 lb. f.o.b. Pittsburgh mill for large mill lots, together with warehouse prices at Chicago and Birmingham:

	Pittsburgh	Chicago	Birmingham
Standard spikes, ⅝-in. and larger	$2.80	$3.55	$3.00
Track bolts	3.80	4.55	3.90
Standard section angle bars, splice bars or fishplates	2.75	3.40	3.00

WROUGHT STEEL PIPE—On deliveries from warehouses at the places named the following discounts hold for welded steel pipe:

	Black		
	New York	Chicago	St. Louis
1 to 3 in. butt welded	50%	54%	49%
2½ to 6 in. lap welded	45%	51%	46%
	Galvanized		
	New York	Chicago	St. Louis
1 to 3 in. butt welded	36%	41%	36%
2½ to 6 in. lap welded	32%	38%	33%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches—External	Diameter in Inches—Internal	Thickness Inches
⅛	$0.17	1.315	1.049	.133
¼	.23	1.66	1.38	.14
⅜	.27½	1.9	1.61	.145
½	.37	2.375	2.067	.154
¾	.58½	2.875	2.469	.203
1	.76½	3.5	3.068	.216
1¼	.92	4.0	3.548	.226
1½	1.09	4.5	4.026	.237
2	1.27	5.0	4.506	.247
2½	1.48	5.563	5.047	.258
3	1.92	6.625	.065	.28

CAST-IRON PIPE—Prices, f.o.b., per net ton, for Class B in large mill lots:

	Birmingham	Burlington, N. J.	New York
4 in.	$37.00	$40.00	$42.60
6 in. and over	34.00	37.00	39.60

	Pittsburgh	Chicago	St. Louis	San Francisco
4 in.	$45.50	$45.20@46.20	$42.60	$47.00
6 in. and over	42.50	42.20@43.20	39.60	44.00

Gas pipe and Class "A," $3.00 per ton extra.

BOLTS AND NUTS—Discounts from list, Apr. 1, 1927, on immediate deliveries from warehouse in New York and vicinity: Machine bolts, square heads and nuts, up to 1x30-in., full packages, 50%; Carriage bolts up to ¾ x 6-in., full packages, 55%; Nuts, hot-pressed or cold-punched, blank or tapped, square or hexagonal, full packages, 55%.

STEEL PLATES—Following are base prices per 100 lb. in large mill lots, f.o.b., for ¼-in. thick and heavier:

Pittsburgh $1.85 Birmingham $2.05

STRUCTURAL RIVETS—The following quotations are per 100 lb., in mill lots, f.o.b. mill, for ¾-in.:

Pittsburgh $2.90 Cleveland $2.90 Chicago $3.00

WIRE ROPE—Discounts from list price on regular grades of bright and galvanized, in New York and territory east of Missouri River:

	Per Cent
Plow steel round strand rope	35
Special steel round strand rope	30
Cast steel round strand rope	20
Round strand iron and iron tiller	5
Galvanized steel rigging and guy rope	7½
Galvanized iron rigging and guy rope (add to list)	12½

RAIL BONDS—Stranded copper, 28-in., 4/0, B. & S. gage, arc welded, at points east of the Mississippi, price per 100 net $93.18

DRILL ROD—Discounts from list at warehouse:

New York 60% Cleveland 55% Chicago 50%

FRICTION TAPE—Size ¾-in. in 100 lb. lots in Eastern territory, per lb., $0.29

RAILWAY TIES—For fair-sized orders, f.o.b., the following prices per tie hold:

	6 In. x 8 In. by 8 Ft.	7 In. x 9 In. by 8½ Ft.
Chicago, white oak, heart, untreated	$1.40	$1.78
Chicago, oak, empty cell creosoted	1.80	2.40
Chicago, oak, zinc treated	1.60	2.10
Chicago, Southern pine, creosoted	1.60	2.10
St. Louis, white oak, untreated	1.20	1.80
St. Louis, red oak, creosoted	1.50	2.30
St. Louis, sap pine or cypress, untreated	1.00	1.60
Birmingham, Southern pine, untreated	1.10	1.25
Birmingham, Southern pine, creosoted	1.60	1.75

STEEL MINE TIES—Prices range from $0.38 to $0.60 per tie, f.o.b. Pennsylvania and West Virginia districts, depending on quantity, gage of track and weight of rail.

CALCIUM CARBIDE—In drums, round lots in New York market, per lb., $0.05@$0.06.

BRATTICE CLOTH—Prices f.o.b. cars New York, Philadelphia, St. Louis or Chicago, per sq.yd.:

Jute, 24-oz., double warp	$0.20	Jute, waterproof	$0.23
Jute, 22-oz., single warp	.18	Duck, waterproof	.34
Jute, 18-oz., single warp	.16	Duck, non-inflammable	.33

COTTON WASTE—The following prices are in cents per lb. for bale lots:

	New York	Cleveland	Chicago
White	10.00@13.50	16.00	15.00
Colored	9.00@13.00	12.00	12.00

MACHINE OIL—Medium bodied, in 55 gal. metal barrels, per gal., as follows:

New York $0.30 Cleveland $0.36 Chicago $0.36

SCRAP IRON AND STEEL—The prices following are f.o.b. per ton paid by dealers:

	New York Per Gross Ton	Chicago Per Gross Ton	Birmingham Per Gross Ton
No. 1 railroad wrought	$9.00@ $9.50	$12.50@$13.00	$11.00@$11.50
Stove plate	8.25@ 8.75	13.00@ 13.50	9.00@ 9.50
No. 1 machinery cast	12.50@ 14.00	15.00@ 15.50	12.50@ 14.00
Machine shop turnings	6.00@ 6.50	6.50@ 7.00	7.00@ 7.25
Cast borings	6.00@ 6.50	9.00@ 9.50	7.25@ 7.50
Railroad malleable	10.00	12.50@ 13.00	10.25@ 10.75
Re-rolling rails	10.00@ 10.50	14.50@ 15.00	10.25@ 10.75
Re-laying rails, 56@60 lb.	23.00@ 24.00	23.00@ 25.00	23.00@ 24.00
Heavy melting steel	9.00@ 9.85	12.50@ 13.00	9.50@ 10.00

SCRAP COPPER AND BRASS—Dealers' purchasing prices in cents per lb.:

	New York	Cleveland	Chicago
Crucible copper	12.75 @ 13.00	12.00	11.75@ 12.25
Copper, heavy, and wire	12.00 @ 12.75	11.25	11.25@ 11.75
Copper, light, and bottoms	10.75 @ 11.25	9.75	10.00@ 10.50
Brass, heavy, yellow	7.12½@ 7.37½	7.75	7.25@ 7.75
Brass, heavy, red	10.00 @ 10.25	10.00	9.50@ 9.75
Brass, light	5.50 @ 6.00	6.25	6.25@ 6.75
No. 1 yellow rod turnings	8.00 @ 8.25	7.75	7.50@ 8.00

COPPER WIRE—Prices of bare wire, base, at warehouse, in cents per lb. are as follows:

New York 20.12½ Cleveland 19.62½ Chicago (mill) 16.75

TROLLEY WIRE—In carload lots, f.o.b., producing point, all sizes, per lb.:

Round $0.1662½ Grooved $0.1687½ Fig. 8 $0.173 ½

TROLLEY WHEELS—Price f.o.b. Jersey City, N. J., each:

4-in. $1.00 5-in. $1.40 6-in. $1.70

MINING MACHINE CABLE—F.o.b. producing point, net, per M. ft.:

No. 2 Duplex Flat, Braided		Two Conductor, Round Rubber Sheathed	
Size 2–133	$182.00	Size 2–133	$669.00
Size 3–133	162.00	Size 3–133	579.00
Size 4–133	143.00	Size 4– 49	470.00

LOCOMOTIVE CABLE—F.o.b. producing point, single conductor, braided, net on reels containing 1,500 ft., per M. ft.:

Size 3 $89.60 Size 4 $66.30

FEEDER CABLE—Price per M. ft. in larger buying centers east of the Mississippi River:

B. & S. Size	Two Conductor	Three Conductor
No. 14 solid	$30.00 (net)	$44.00 (net)
No. 12 solid	136.00	180.00
No. 10 solid	185.00	235.00
No. 8 stranded	305.00	375.00
No. 6 stranded	440.00	530.00

From the above lists discounts are: Less than coil lots, 50%; Coils to 1,000 ft., 60%; 1,000 to 5,000 ft., 65%; 5,000 ft. and over, 67%.

EXPLOSIVES—F.o.b. in carload lots:

Black Powder	Districts: West Virginia	Pennsylvania	Missouri
FF, $NaNO_3$ base, 800 kegs per car, per 25 lb. keg	$1.70@ $1.80	$1.70	$1.75
Ammonium permissible 1¼ x 8 in. sticks, 20,000 lb. per car, per 100 lb.	14.00@15.00	13.75	14.00

Among the Manufacturers

LINK-BELT Co. has issued a new catalog—No. 500—covering, in engineering data and list prices, the entire chain, sprocket, power transmission, elevating and conveying and engineering divisions of the company's business. Comprising 1,088 pages, the book contains information that will enable engineers to design plants with standard materials-handling equipment and also supplies complete price information on all material required.

* * *

NATIONAL FLUE CLEANER CO., INC., Groveville, N. J., recently appointed these new representatives: Fuel Efficiency Engineering Co., American Trust Building, Birmingham, Ala.; A. S. Furtwangler, 4 South Broad Street, Charleston, S. C.; Reed & Duecker, Inc., 171 North Main Street, Memphis, Tenn.; Buckmaster-Luck-Malochee, Inc., Industrial Homestead Building, New Orleans, La., and Henry Eggelhof, Construction Industries Building, Dallas, Texas.

* * *

THE WAGNER ELECTRIC CORPORATION, St. Louis, Mo., announces that Fred Johnson, heretofore in charge of its St. Louis sales office, is now manager of the Los Angeles office. Alex L. Miltenberger has been transferred from the San Francisco office to take charge of the St. Louis office.

* * *

THE SWEET'S STEEL CO., Williamsport, Pa., announces the appointment of Silas M. Haight as manager of its research department. Samuel C. Rebman has been appointed district sales manager in the anthracite district with offices in the Miners' Bank Building, Wilkes-Barre, Pa.

* * *

THE ECONOMY FUSE & MFG. CO. recently purchased the "Federal National" renewable fuse department, including all material, physical property, patents and good will of the "Federal National" renewable fuse, from the Federal Electric Co., Chicago.

* * *

VAN DORN ELECTRIC TOOL CO., Cleveland, Ohio, has established a complete warehousing and service depot at 525 E. 10th St., Oakland, Calif.

CHICAGO PNEUMATIC TOOL CO. announces the following appointments: W. S. Lynch, formerly district manager at Seattle, Wash., made district manager of Cincinnati office, to succeed T. G. Smallwood, who has been granted an indefinite leave of absence on account of ill health; A. M. Andresen has been named acting district manager at Seattle.

* * *

HULBURT OIL & GREASE CO. has added B. McIntosh and Lester W. Hogg, formerly with the Goodman Mfg. Co., to its sales force. Mr. McIntosh will cover Illinois territory and Mr. Hogg, southern West Virginia.

* * *

THE CELORON CO., a division of the Diamond State Fibre Co., Bridgeport, Pa., announces the appointment of R. W. Wales as factory representative on molding powders and resins.

THE ELLIOTT CO. OF CALIFORNIA was recently organized with headquarters at 813 Rialto Building, San Francisco, Calif. The officers of the new corporation are W. S. Elliott, president; F. A. Calmus, vice-president and general manager, and C. W. Moore, secretary-treasurer. A district office has been opened in Los Angeles at 528 Security Building, in charge of W. A. S. Harmon.

* * *

JOHN R. POWELL, Plymouth, Pa., has taken over the business and good will of the Blue Label Squib Mfg. Co., also of Plymouth.

* * *

THE GRAND RAPIDS (Mich.) branch office of Allis-Chalmers Mfg. Co. has been moved to 310 Building and Loan Building. G. C. Culver is in charge.

Trade Literature

Crouse-Hinds Co., Syracuse, N. Y., recently issued the following two bulletins: Groundulets and Other Safety Circuit Devices, Bulletin G-7, 12 pp., and Ground for Safety, Bulletin G-8. Both bulletins are illustrated.

Oxwelding and Cutting Equipment. Oxweld Acetylene Co., New York City. Pp. 56; illustrated. Describes equipment for welding, cutting, brazing, lead burning, heating and decarbonizing. C-14 cutting blowpipe, the Carbic portable low-pressure acetylene generators and Carbic floodlights also are described.

More and Better Production at Less Cost—What New Departure Ball Bearings Mean to Machine Tools. New Departure Mfg. Co., Bristol, Conn. Pp. 19; illustrated.

Arc Welding in G-E Factories and Arc Welding in Industry are the titles of two bulletins issued by the General Electric Co., Schenectady, N. Y. The former has 27 pp. and the latter 31. Illustrated.

Truscon Steel Co., Youngstown, Ohio, has issued Catalog 126, Continuous Steel Windows and Mechanical Operators, 32 pp., and Catalog No. 110, Copper Alloy Steel Doors, 48 pp. Illustrated.

Wagner Electric Corporation, St. Louis, Mo. Bulletin 156, illustrated, describes its sleeve bearing and double-cap ball bearing.

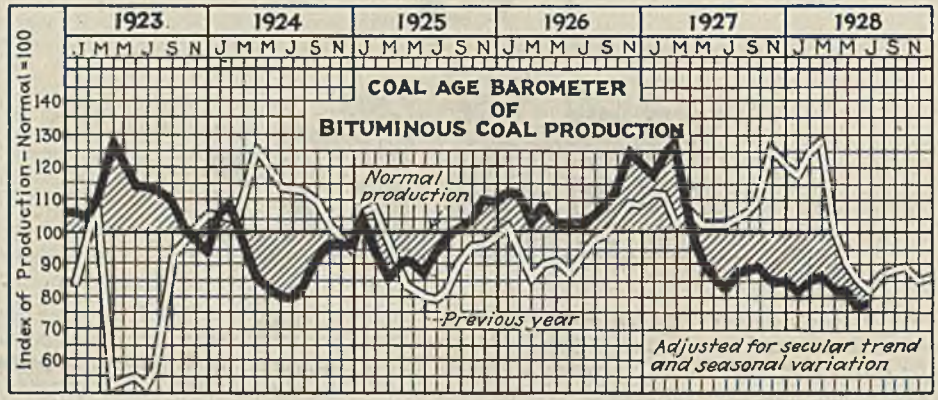
Pure Iron Plates for Long Service is the title of a 20-pp. bulletin issued by the American Rolling Mill Co., Middletown, Ohio, describing the physical properties, weldability, rust resistance, uniformity, etc., of Armco ingot iron plates.

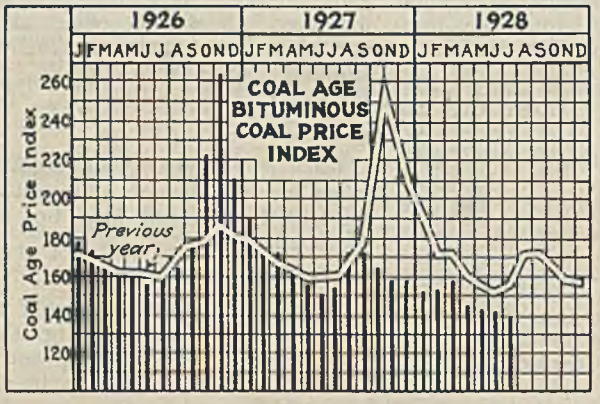
Oxweld Acetylene Co., New York City, has issued a booklet of 12 pp. illustrating and describing the uses of Carbic portable generators.

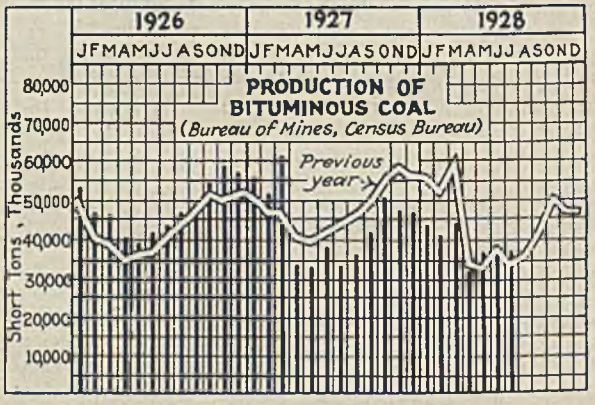
General Electric Co., Schenectady, N. Y., has issued these bulletins: GEA-19D, CR7006-D4 and D-5 A-c Enclosed Magnetic Switches for starting small single, two and three-phase alternating current motors that can be thrown directly on the line; GEA-468A, CR3105 Drum-Type Controllers for use with direct-current adjustable-speed motors; GEA-743, CR3203 Drum Controllers for two- or three-phase slip-ring induction motors; GEA-881, Arc Welder, Gas-Engine-Driven; GEA-949, CR2904 Temperature Overload Relay Panels; GEA-383B, Low-Speed Synchronous Generators; GEA-569A, Constant-Potential Arc Welding Sets; GEA-588A, Centrifugal Air Compressors, Geared Units; GEA-865, Multi-Speed Induction Motors, squirrel cage and wound rotor; GEA-874, Type WD-200A Arc Welder; GEA-197A, Mechanical Drive Turbines; GEA-360B, Remote-Indicating Speed Controller; GEA-724A, Totally Enclosed Fan-Cooled Induction Motors; GEA-823A, Atomic Hydrogen Arc Welding Equipment, for hand welding on 50- and 60-cycle circuits only; GEA-980, Enclosed Speed-Regulating Rheostats.

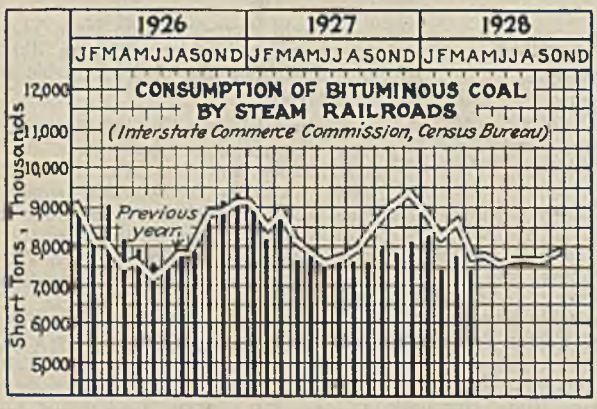
Automatic Arc-Welding by the Electronic Tornado Process. Lincoln Electric Co., Cleveland, Ohio. Pp. 8; illustrated. Describes this new process and includes a table showing the speed and costs of automatic arc welding of metal of different thicknesses for various joints.

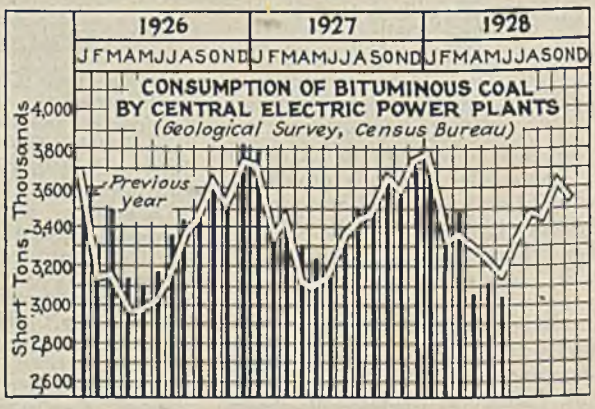
Indicators of Activities in the Coal Industry

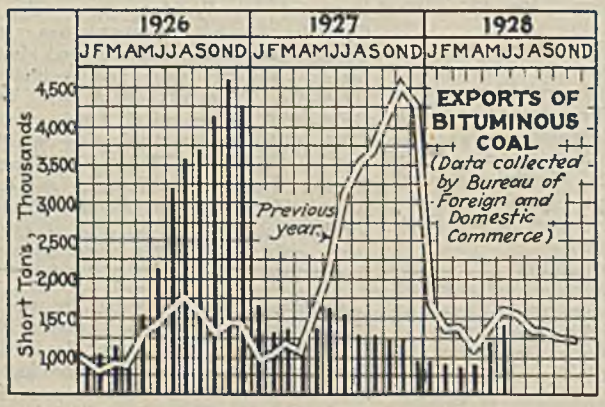


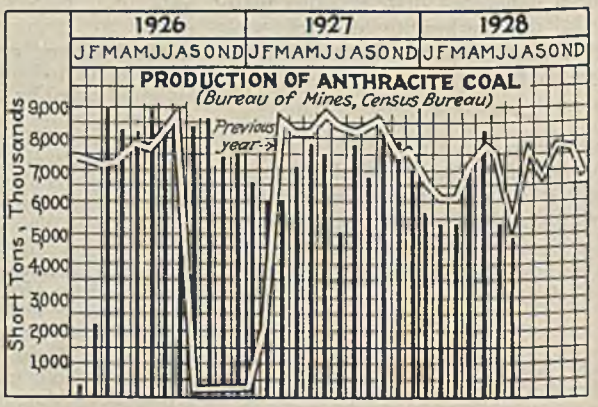












MARKETS *in Review*

DESPITE the optimistic tone of financial reports on the general business situation in the United States, the coal industry registered no measurable improvement during July. The average daily output of bituminous coal increased 4.8 per cent over the June rate but the average sales realization in the spot markets of the country was slightly less in July than in the preceding month, dropping from $1.726 to $1.6975 per net ton.

Anthracite exhibited its usual steadiness in prices on the domestic sizes and steam quotations were without notable fluctuation. This steadiness, however, was attained at the cost of further declines in production. The July daily average was 12.7 per cent under the June average. Production for the first seven months of 1928 was approximately 4,500,000 net tons behind the figures for the corresponding period last year—and last year's total output lagged 7,800,000 tons behind 1924.

The preliminary estimates of production made by the U. S. Bureau of Mines credit July with a bituminous output of 36,230,000 tons, as compared with 35,963,000 tons in June and 33,637,000 tons in July, 1927. Anthracite production last month approximated 4,441,000 net tons; in June it was 5,301,000 tons and in July of last year, 5,028,000 tons. Beehive coke output dropped from 301,000 tons to 269,000 tons.

WEAKNESS in spot bituminous quotations the past month reflected the slow rate at which industrial stockpiles are diminishing, the slight increase in productive activity at the mines, freight-rate uncertainties and the unsettlements feared as a result of the decision of the international policy committee of the United Mine Workers to abandon the Jacksonville scale as the basis for wage negotiations. It is significant that the sharpest decline was felt in the western Kentucky field, where competition with union Illinois and Indiana has been most severe.

Western Kentucky, however, was not alone in feeling the effects of the depressing factors outlined. As a matter of fact, with the exception of the Pittsburgh and Pocahontas-New River districts, the undercurrent was weak in all important producing areas in the bituminous region. From every quarter came reports of consumer indifference to the matter of supplies and sacrifice sales.

Coal Age Index of spot bituminous prices for the month of July was 140 and the corresponding weighted average price was $1.69¾. By weeks the unrevised Index figures were: July 7, 138; July 14, 140; July 21, and 28, 141. Weighted average prices (unrevised) for the same period were $1.67, $1.70 and $1.71, respectively. Revised June Index figures were: June 2, 142; June 9, 143; June 16, 142; June 23 and 30, 143: the weighted average prices were $1.72, $1.73, $1.72 and $1.73, respectively.

INDUSTRIAL stockpiles have not been melting away with the rapidity some factors in the trade would like. The figures gathered by the National Association of Purchasing Agents show a decline of little over 1,000,000 tons during June with a decrease of approximately 2,333,000 tons in consumption when compared to May. There is nothing in available commercial reports to indicate any substantial increase in consumption last month.

Nevertheless general trade commentators take a cheerful view of the future. The level of general business activity has shown an unusually moderate reaction from the rates that obtained earlier in the year, according to the *Guaranty Trust Review*. There is a well-sustained demand in several basic industries and retail trade is expanding. Progress in the steel trade with July operations ahead of the rate for the preceding month and greater than a year ago is pointed out by the National City Bank and other observers.

The prospects of a new wage scale in Illinois and Indiana have had a crippling effect upon demand in the Chicago market. Business, which had been quietly gaining prior to the announcement of the new union wage policy, subsided as all classes of buyers of Illinois, Indiana and western Kentucky coals deserted the market. This move was in anticipation of lower prices.

WHETHER such hopes are justified, however, seems open to serious doubt. Many operators in the Middle West feel that the deflation in prices has preceded the deflation in labor costs by several moons. As a matter of fact southern Illinois operators announced an increase of 15c. in August prices on lump and egg and a reduction of 15c. on small steam coal.

There was little life to active trading the last half of July. Indiana screenings were hard hit, western Kentucky slumped and central Illinois producers met the situation by refusing to compete in the Chicago market at bid figures. Fifth Vein Indiana screenings

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

		Week Ended							
		July 7, 1926		July 14, 1926		July 21, 1928		July 26, 1928	
	Market Quoted	Independent	Company	Independent	Company	Independent	Company	Indpendent	Company
Broken	New York	.....	$8.25	.....	$8.25	.....	$8.25	.....	$8.25
Broken	Philadelphia	$8.25@$8.50	8.50	$8.25@$8.50	8.50	$8.25@$8.50	8.50	$8.25@$8.50	8.50
Egg	New York	8.25@ 8.50	8.50	8.20@ 8.50	8.50	8.25@ 8.50	8.50	8.25@ 8.50	8.50
Egg	Philadelphia	8.50@ 8.75	8.50	8.50@ 8.75	8.50	8.50@ 8.75	8.50	8.50@ 8.75	8.50
Egg	Chicago*	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.59
Stove	New York	8.60@ 8.85	8.85	8.60@ 8.85	8.85	8.60@ 8.85	8.85	8.60@ 8.85	8.85
Stove	Philadelphia	8.85@ 9.10	8.15	8.85@ 9.10	8.85	8.85@ 9.10	8.85	8.85@ 9.10	8.85
Stove	Chicago*	7.90	7.90	7.90	7.90	7.90	7.90	7.90	7.90
Chestnut	New York	8.25@ 8.50	8.50	8.20@ 8.50	8.50	8.25@ 8.50	8.50	8.25@ 8.50	8.50
Chestnut	Philadelphia	8.50@ 8.75	8.50	8.50@ 8.75	8.50	8.50@ 8.75	8.50	8.50@ 8.75	8.50
Chestnut	Chicago*	7.59	7.59	7.59	7.59	7.59	7.59	7.59	7.59
Pea	New York	4.75@ 5.00	5.00	4.50@ 5.00	5.00	4.75@ 5.00	5.00	4.75@ 5.00	5.00
Pea	Philadelphia	5.00@ 5.25	5.00	5.00@ 5.25	5.00	5.00@ 5.25	5.00	5.00@ 5.25	5.00
Pea	Chicago*	4.45	4.45	4.45	4.45	4.45	4.45	4.45	4.45
Buckwheat	New York	2.75@ 3.00	3.00†	2.50@ 3.00	3.00†	2.75@ 3.00	3.00†	2.85@ 3.00	3.00†
Buckwheat	Philadelphia	3.00@ 3.25	3.00†	3.00@ 3.25	3.00†	3.00@ 3.25	3.00†	3.00@ 3.25	3.00
Rice	New York	1.80@ 2.00	2.25	1.80@ 2.00	2.25	1.75@ 2.25	2.25	1.85@ 2.25	2.25
Rice	Philadelphia	2.25@ 2.50	2.25	2.25@ 2.50	2.25	2.25@ 2.50	2.25	2.25@ 2.50	2.25
Barley	New York	1.15@ 1.60	1.70@ 1.75	1.10@ 1.60	1.70@ 1.75	1.25@ 1.75	1.70@ 1.75	1.30@ 1.75	1.75
Barley	Philadelphia	1.75@ 2.00	1.75	1.75@ 2.00	1.75	1.75@ 2.00	1.75	1.75@ 2.00	1.75

*Net tons, f.o.b. mines. †Domestic buckwheat, $3.25 (P. & R.) and $3.50 (D. L. & W.)

sold at $2.55@$3 f.o.b. Chicago; Fourth Vein, $2.75@$3.25. Southern Illinois lump was offered at 15 to 25c. less than circular.

Retail distributors showed more interest in West Virginia smokeless, pressing for increased deliveries on July orders to forestall the advance of 25c. on lump, egg and mine-run announced for August. Eastern high-volatile coals were dull; ordinary grades of block and egg were in light demand and the call for premium coals was weak.

IN THE St. Louis market conditions were no better than, if as good as, at Chicago. Outside of a few Franklin County operations, three days was considered good running time. "No bills" were the common lot. Eastern coals moved slowly and coke sales were not active. Shippers of Arkansas anthracite are making a drive upon this market. Hope is expressed that retail buying will improve in August.

Western Kentucky traders are inclined to pessimism as a result of the retreat of the union from the Jacksonville scale. The opinion is expressed that a reduction in Illinois and Indiana will place western Kentucky in a position where it can no longer make prices which will absorb freight-rate differentials against it. Eastern Kentucky is concerned over the lake rates.

Conditions in the eastern part of the state, however, are relatively better than in the western section. Notwithstanding decreased shipments to the lakes, eastern Kentucky coal is finding outlets in other directions, but at unsatisfactory prices. Block is selling at $1.65@$2.50 with premium grades bringing up to $3; egg, lump and nut, $1.50@$1.75. Slack has been 70c.@$1.10 with some coal down to 50c.

THE volume of business moving out over the docks at the Head of the Lakes last month was normal. Shipments were estimated at 12,000 cars, as compared with 12,279 cars in June and 13,367 cars in July, 1927. Stocks on hand at the docks July 31 were estimated at 4,700,000 tons of bituminous and 550,000 tons of anthracite. Dock operators plan on bringing up a total of 10,000,000 tons of soft coal and 800,000 tons of hard coal.

Sales representatives have been busy combing dock territory for orders and considerable progress has been made in closing up seasonal contracts with regular industrial consumers. A number of municipal contracts have been awarded retail dealers on the iron range at full list prices. Demand for West Virginia low-volatile coals is growing. Operators look forward to good business in southern Minnesota despite all-rail competition.

Seasonal dullness is still the lot of the Kansas City wholesale trade. Retailers, however, reported demand for Arkansas semi-anthracite as good as or better than a year ago. As a result that mining section is enjoying the best running time of any of the Southwestern fields. Many shaft mines in Kansas are down and three to four days is the most others can get. Weather has curtailed strip-pit production and screenings are firm at $2@$2.25.

SIGNS of an early improvement in domestic demand in the Colorado market are seen at Denver although business the past month was sluggish. More inquiries now are coming in. Prices on sized coal from the Colorado and Wyoming fields were unchanged last month. Colorado steam coals were offered at $1.25@$1.40; Rock Springs and Kemmerer coals, $1.30@$1.45. The Utah market was quiet.

Decreased production south of the Ohio River failed to liven up the Cincinnati market last month. Aside from low-volatile coals, prices were extremely soft and buying indifferent. Advertised high-volatile lump and block sold at $2.25@$3, but the garden varieties sold at $1.50@$2. Egg was draggy. Mine-run was slow. Slack, after a bad break about the middle of July, regained some ground.

On the other hand, demand for smokeless egg was strong enough to keep prices pegged at a $3.60 level for choice coal. Lump was $3@$3.25, but stove and nut were heavy. The movement of mine-run was sufficiently brisk to make some shippers feel safe in asking a $2.50 price on August contracts. Spot mine-run, however, has been selling at $2@$2.25. Slack still drags.

SLUGGISHNESS has been the keynote of the Columbus market during July. About the only real change from conditions prevailing the preceding month was the fact that industrial stockpiles were somewhat lower and some of the larger retail distributors started to buy storage coal in limited quantities. Some lake coal is going out of the Pomeroy district, but Ohio as a whole is not now a factor in this trade. The Cleveland market has been colorless.

The month of July was a disappointing one to Pittsburgh operators in the face of a slightly stronger price situation in the spot market. Unfavorable developments were tied up with the lake-rate embroglio. Little open-market buying of Pittsburgh coal for lake shipment was in evidence, leading producers to believe that their Southern friends were absorbing the increased rate differential in the prices named on coal for the Virginias and Kentucky.

Up to July 29 cargo dumpings at the lower lake ports totaled 14,146,579 net tons of bituminous coal, as compared with 18,246,741 tons during the same period last year and 14,024,386 tons in 1926. For the week ended at 7 a.m. Aug. 6 cargo dumpings were 1,268,028 tons. Anthracite shipments from Lake Erie ports to July 29 totaled 770,965 net tons as compared with 945,273 tons last year and 1,454,677 tons in 1926.

IN New England the steam coal trade is in an extremely unsatisfactory position. While production is better controlled than it was earlier in the season and prices are more stable, oversolicitation by agencies struggling to

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

		Week Ended—			
	Market Quoted	July 7, 1928	July 14, 1928	July 21, 1928	July 28, 1928
LOW-VOLATILE, EASTERN					
Smokeless lump	Columbus	$3.00@$3.25	$3.00@$3.25	$3.00@$3.25	$3.00@$3.25
Smokeless mine-run	Columbus	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00
Smokeless screenings	Columbus	.75@ 1.00	.75@ 1.00	.75@ 1.00	.75@ 1.00
Smokeless lump	Chicago	3.00@ 3.25	3.00@ 3.50	3.00@ 3.50	3.00@ 3.50
Smokeless mine-run	Chicago	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Smokeless lump	Cincinnati	3.00@ 3.25	3.00@ 3.25	3.00@ 3.50	3.00@ 3.50
Smokeless mine-run	Cincinnati	1.85@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.35
Smokeless screenings	Cincinnati	1.00@ 1.25	1.10@ 1.25	1.10@ 1.25	1.10@ 1.25
Smokeless mine-run*	Boston	4.00@ 4.20	3.95@ 4.15	3.95@ 4.10	4.00@ 4.15
Clearfield mine-run	Boston	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
Cambria mine-run	Boston	1.85@ 2.10	1.85@ 2.10	1.80@ 2.30	1.85@ 2.15
Somerset mine-run	Boston	1.60@ 1.90	1.60@ 1.95	1.65@ 2.00	1.60@ 1.90
Pool 1 (Navy Standard)	New York	2.30@ 2.50	2.30@ 2.50	2.30@ 2.50	2.30@ 2.50
Pool 1 (Navy Standard)	Philadelphia	2.30@ 2.60	2.30@ 2.60	2.30@ 2.60	2.30@ 2.60
Pool 1 (Navy Standard)	Baltimore	2.15@ 2.25	2.15@ 2.25	2.15@ 2.25	2.15@ 2.25
Pool 9 (super. low. vol.)	New York	1.65@ 1.90	1.65@ 1.90	1.70@ 1.95	1.70@ 1.95
Pool 9 (super. low. vol.)	Philadelphia	1.80@ 2.15	1.80@ 2.15	1.80@ 2.15	1.80@ 2.15
Pool 9 (super. low. vol.)	Baltimore	1.70@ 1.80	1.70@ 1.80	1.70@ 1.80	1.70@ 1.80
Pool 10 (h. gr. low. vol.)	New York	1.55@ 1.85	1.55@ 1.85	1.55@ 1.85	1.55@ 1.85
Pool 10 (h. gr. low. vol.)	Philadelphia	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80
Pool 10 (h. gr. low. vol.)	Baltimore	1.40@ 1.60	1.50@ 1.60	1.50@ 1.60	1.50@ 1.60
Pool 11 (low. vol.)	New York	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60
Pool 11 (low. vol.)	Philadelphia	1.40@ 1.65	1.40@ 1.65	1.40@ 1.65	1.40@ 1.65
Pool 11 (low. vol.)	Baltimore	1.35@ 1.40	1.35@ 1.40	1.35@ 1.40	1.35@ 1.40
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
Pool 54-64 (gas and st.)	Baltimore	1.25@ 1.35	1.25@ 1.35	1.25@ 1.35	1.25@ 1.35
Pittsburgh sc'd gas	Pittsburgh	1.90@ 2.10	1.90@ 2.10	2.00@ 2.25	2.00@ 2.25
Pittsburgh gas mine-run	Pittsburgh	1.75@ 1.90	1.75@ 1.90	1.75@ 1.90	1.75@ 1.90
Pittsburgh st. mine-run	Pittsburgh	1.40@ 1.90	1.40@ 1.90	1.40@ 1.90	1.40@ 1.90
Pittsburgh gas slack	Pittsburgh	1.10@ 1.20	1.10@ 1.20	1.15@ 2.25	1.20@ 1.25
Kanawha lump	Columbus	1.70@ 2.15	1.70@ 2.10	1.70@ 2.10	1.70@ 2.10
Kanawha mine-run	Columbus	1.25@ 1.60	1.25@ 1.60	1.25@ 1.60	1.25@ 1.60
Kanawha screenings	Columbus	.80@ 1.00	.80@ 1.00	.80@ 1.00	.80@ 1.00
W. Va. lump	Cincinnati	1.50@ 2.50	1.50@ 2.50	1.60@ 2.50	1.50@ 2.50
W. Va. gas mine-run	Cincinnati	1.40@ 1.65	1.40@ 1.65	1.40@ 1.60	1.40@ 1.60
W. Va. steam mine-run	Cincinnati	1.10@ 1.40	1.10@ 1.40	1.10@ 1.40	1.10@ 1.40
W. Va. screenings	Cincinnati	.75@ 1.10	.75@ 1.00	.50@ 1.00	.75@ 1.00
Hocking lump	Columbus	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Hocking mine-run	Columbus	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75
Hocking screenings	Columbus	1.10@ 1.25	1.15@ 1.35	1.15@ 1.35	1.20@ 1.35
Pitts. No. 8 lump	Cleveland	1.75@ 2.15	1.75@ 2.15	1.75@ 2.15	1.75@ 2.15
Pitts. No. 8 mine-run	Cleveland	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75
Pitts. No. 8 screenings	Cleveland	2.10@ 1.35	1.20@ 1.35	1.00@ 1.25	1.00@ 1.25

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

get rid of odd lots upset on-car prices, which have slumped 35 to 40c. at Boston. Month-end quotations were $4.90 @$4.95.

During the last week in July Navy Standard sold at $4.10 per gross ton f.o.b. vessel Hampton Roads. Nut-and-slack is quoted at $3.50@$3.60 with actual sales as low as $3.40. On cars at Boston nut-and-slack quotations are $4.50@$4.60. There is little demand for all-rail Pennsylvania coals in the New England tidewater zone. Most of the limited tonnage is moving to Connecticut River points and west.

There is a better tone to the soft-coal market at New York. Inquiries are more numerous and wholesale houses profess the belief that the turning point in the trade is close at hand. They feel that industrial stockpiles are nearing the danger point. Free coals, however, are not in active demand although contract tonnage is moving readily. Spot prices showed little fluctuation over the past month.

PHILADELPHIA coal men, who have always looked to July as the turning point, unlike their confrères at New York, feel that this year will prove an exception. There is little buying for winter storage and too much consumption of stockpile coal to suit shippers anxious to place fresh-mined tonnage. Railroad purchasing agents say they will not be in the market before the middle of August. Bunkering trade runs in ordinary channels and export demand is dead. A condition approach-stagnation characterizes the spot market at Baltimore.

"Dull and uninteresting" described the course of the Birmingham market during the past month. Spot sales for the most part were limited to tonnage for immediate requirements and competitive bidding on this business had a demoralizing effect upon open-market prices. Consumption of coking coals showed no increase over June. Bunker trade was dull although some factors reported increased movement.

A slight improvement was discernible in the domestic side of the market. Little new business was found and many suspensions on contract shipments continued in effect. Nevertheless some producers were handicapped in taking care of the orders on their books because there was practically no demand for free slack. August quotations are as follows: Big Seam lump, $1.75@$2.25; Carbon Hill, $2@$2.95; Cahaba, $4.05@$4.80; Black Creek, $4.30@$4.55; Montevallo, $4.80@$5.55.

ANTHRACITE dragged in the New York market last month. Retail dealers, faced with indifference upon the part of domestic consumers, were not inclined to increase their commitments. Steam sizes were the most active, with No. 1 buckwheat the leader in demand. This strength, however, was due to curtailed production, not to an expansion in market. Prices on independent coals were within 25c. of company schedules.

At Philadelphia top independent quotations are still above company circular. With few exceptions, however, the sale of coal at a premium has disappeared in the struggle to find a market for current production. There are few bargain-counter offers of steam sizes at Quakertown. Most of the sacrifice tonnage moves through New York, where the opportunities for a quick turnover of large blocks of coal at price concessions are so much greater.

The fact that July demand has been so low was no surprise to the Philadelphia trade. Retail distributors appeared to be content to run along on the stocks accumulated prior to the 25c. advance at the mines and did not push consumers to fill their cellars. It is expected, however, that the last half of August will see an active buying movement in anticipation of the second 25c. advance scheduled for Sept. 1.

ALTHOUGH there has been nothing remotely resembling a shortage, nut is the size in greatest demand in the Philadelphia market. Stove is less easily obtainable as a result of the short running time. Egg, under curtailed production, has maintained its position. Pea has been the weak member of the domestic family, but better days are believed to be in store for it. There has been no shortage in steam sizes.

During June, the latest month for which figures are available, the United States exported 209,375 gross tons of anthracite, of which 206,697 tons went to Canada. May exports were 266,310 tons; in June, 1927, however, the total was 303,951 tons. Bituminous exports —1,276,843 gross tons—exceeded the May total by 132,418 tons but showed a decline of 417,201 tons when compared to June, 1927.

Canada, of course, was the biggest customer, taking 1,140,725 tons of bituminous coal in June. Cuba came second with 27,779 tons. The French West Indies took 18,709 tons; Italy, 16,900; Egypt, 11,777, and Brazil, 11,663 tons. Bunker shipments to vessels engaged in foreign commerce totaled 322,232 tons. Coke exports were 125,613 tons, as compared with 89,191 tons in May and 58,837 tons in June, 1927.

JUNE imports of anthracite were 28,970 tons, of which 26,891 tons came from the United Kingdom; imports in June, 1927, were 12,611 tons. Bituminous imports were 26,559 tons, including 20,781 tons of dutiable coal from Canada; the rest was duty-free and came from Japan, Great Britain, Canada and Russia.

Imports of Welsh and Scotch anthracite through the port of Montreal during the first half of 1928 were only 88,836 tons. During the same period in 1927 the total was 275,945 tons. Beginning with the first week of July, however, the movement began to increase, but the total importations for the calendar year are expected to run considerably under the record established in 1927.

British coal exporters are having difficulties in markets other than Canada. The British government has proposed a reduction in transport charges on export and bunker coal as part of a plan to assist the industry with the railroads compensated by lower local taxation. It is estimated that the plan would mean a cut of 15c. per ton, but it is doubtful if the industry, already operating under a loss, would pass the concession on to the buyers of coal in foreign markets.

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

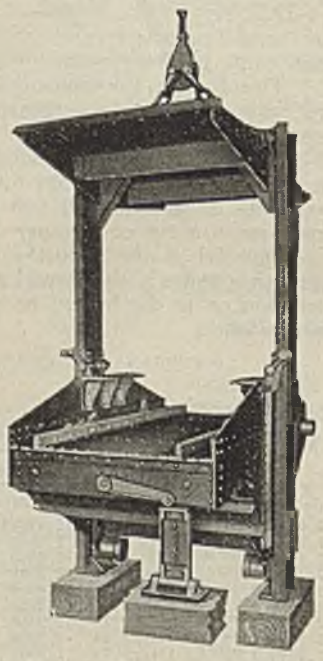
		Week Ended			
MIDDLE WEST	Market Quoted	July 7, 1928	July 14, 1928	July 21, 1928	July 28, 1928
Franklin (Ill.) lump	Chicago	$2.45@$2.60	$2.45@$2.60	$2.45@$2.60	$2.45@$2.60
Franklin (Ill.) mine-run	Chicago	1.90@ 2.40	1.90@ 2.40	1.90@ 2.40	1.90@ 2.40
Franklin (Ill.) screenings	Chicago	1.35@ 1.90	1.35@ 1.90	1.35@ 1.75	1.40@ 1.75
Central (Ill.) lump	Chicago	2.25@ 2.35	2.25@ 2.35	2.25@ 2.35	2.25@ 2.35
Central (Ill.) mine-run	Chicago	1.85@ 2.25	1.85@ 2.25	1.85@ 2.25	1.85@ 2.25
Central (Ill.) screenings	Chicago	1.25@ 1.75	1.10@ 1.75	1.05@ 1.60	1.20@ 1.75
Ind. 4th Vein lump	Chicago	2.35@ 2.75	2.35@ 2.75	2.35@ 2.75	2.35@ 2.75
Ind. 4th Vein mine-run	Chicago	1.45@ 2.25	1.35@ 2.25	1.35@ 2.25	1.35@ 2.25
Ind. 4th Vein screenings	Chicago	1.25@ 1.85	1.15@ 1.75	1.15@ 1.75	1.35@ 1.65
Ind. 5th Vein lump	Chicago	2.15@ 2.50	2.15@ 2.50	2.15@ 2.50	2.15@ 2.50
Ind. 5th Vein mine-run	Chicago	1.30@ 2.10	1.20@ 2.10	1.20@ 2.10	1.20@ 2.10
Ind. 5th Vein screenings	Chicago	.90@ 1.35	.85@ 1.10	.75@ 1.25	1.00@ 1.40
Mount Olive lump	St. Louis	2.35	2.35	2.35	2.35
Mount Olive mine-run	St. Louis	2.25	2.25	2.25	2.25
Mount Olive screenings	St. Louis	1.50	1.50	1.50	1.50
Standard lump	St. Louis	1.90@ 2.10	1.90@ 2.10	1.90@ 2.05	1.85@ 2.00
Standard mine-run	St. Louis	1.65@ 1.75	1.65@ 1.75	1.65@ 1.70	1.60@ 1.65
Standard screenings	St. Louis	1.15@ 1.25	1.15@ 1.25	1.15@ 1.20	1.10@ 1.15
West Ky. block	Louisville	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50
West Ky. mine-run	Louisville	.90@ 1.10	.90@ 1.10	.90@ 1.10	.90@ 1.10
West Ky. screenings	Louisville	.90@ 1.10	.80@ 1.00	.80@ 1.00	.80@ 1.00
West Ky. block	Chicago	1.25@ 1.75	1.25@ 1.75	1.25@ 1.75	1.25@ 1.75
West Ky. mine-run	Chicago	.80@ 1.15	.80@ 1.15	.80@ 1.15	.80@ 1.15
West Ky. screenings	Chicago	.95@ 1.15	.95@ 1.15	.75@ .90	.75@ .90
SOUTH AND SOUTHWEST					
Big Seam lump	Birmingham	$1.75@$2.25	$1.75@$2.25	$1.75@$2.25	$1.75@$2.25
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	1.65@ 2.10	1.65@ 2.10	1.65@ 2.10	1.65@ 2.10
S. E. Ky. mine-run	Chicago	1.40@ 1.65	1.40@ 1.65	1.40@ 1.65	1.40@ 1.65
S. E. Ky block	Louisville	1.75@ 2.25	1.75@ 2.25	1.75@ 2.25	1.75@ 2.25
S. E. Ky. mine-run	Louisville	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.30@ 1.50
S. E. Ky. screenings	Louisville	.90@ 1.25	.80@ 1.00	.80@ 1.00	.65@ 1.00
S. E. Ky. block	Cincinnati	1.75@ 2.25	1.65@ 2.35	1.65@ 2.50	1.65@ 2.50
S. E. Ky. mine-run	Cincinnati	1.10@ 1.75	1.10@ 1.65	1.00@ 1.60	1.10@ 1.65
S. E. Ky. screenings	Cincinnati	.75@ 1.00	.75@ 1.10	.50@ 1.10	.75@ 1.10
Kansas shaft lump	Kansas City	3.50@ 4.00	3.50@ 4.00	3.50@ 4.00	3.50@ 4.00
Kansas strip lump	Kansas City	3.00@ 3.50	3.00@ 3.50	3.00@ 3.50	3.00@ 3.50
Kansas strip mine-run	Kansas City	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.10@ 2.25
Kansas screenings	Kansas City	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25

WHAT'S NEW

In Coal-Mining  *Equipment*

New Cage Is Simple And Efficient

The Eagle Iron Works, Des Moines, Iowa, manufacturer of Olson self-dumping cages, announces the new OC-6 Type with automatic car stop and release mechanism. This cage is claimed to be one of the simplest and most efficient units produced by this company and has eighteen fewer parts than any of its previous models, and a standardization resulting in five less castings.



Easy to Work and Maintain

Therefore there are fewer parts to wear out and fewer castings to be stocked at the mine. The Olson cage is built to meet the individual requirements of each particular installation.

Acid Water Can't Hurt This Alloy

The Barber Asphalt Co., Philadelphia, Pa., announces the production of "Barberite," a high copper bronze alloy containing nickel. Corrosion resisting properties, superior in many instances to various other white nickel and high copper bronzes on the market, are claimed for this new alloy. It is comparable to mild and medium carbon steels in tensile strength and has the additional advantage of high resistivity to corrosive agents.

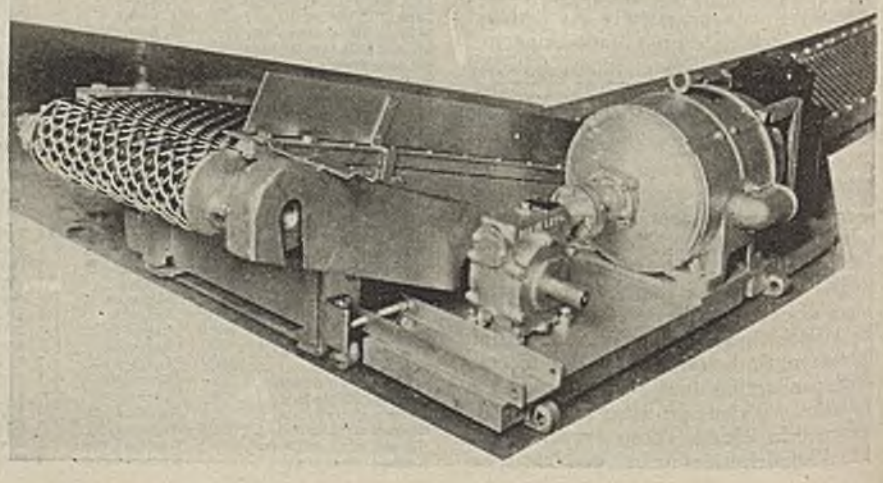
This alloy can be cast in any of the usual forms into which iron, brass or other special alloys are made. The metal has a very fine grain, is not brittle, and is very tough, elastic and dense. Silicon is one of the constituents but has no tendency to segregate, separate into pockets or crystallize out of the metal and thereby cause weak spots to occur. Machining is easy as a result of the fine grain. Where a highly resistant copper bronze is desired, this alloy is especially recommended.

Coal Can Be Shot on This Conveyor

Several advantages are claimed for the new mat conveyor manufactured by Gellatly & Co., Pittsburgh, Pa. The drive and loading end is shown in the accompanying illustration. This conveyor can be made in any length up to 40 ft., is 3 in. high along the running length and 16½ in. over the gooseneck, 20 in. wide and weighs 900 lb. in 25-ft. lengths.

It is built in 5-ft. sections and can easily be shortened by removing two bolts and screwing a spiral out of the mat. The spiral may be removed at any point. Coal may be shot down on it without damage, and when overloaded the mats slip under the material without harm to the driving mechanism. The tendency of flight conveyors to catch on the bottom or on lumps of coal is eliminated by use of the mats.

The power unit may be separated from the conveyor by removing one rod. A 25-ft. conveyor may be split in half, the motor and gear reduction removed, and the whole moved in sections that do not weigh over 350 lb.



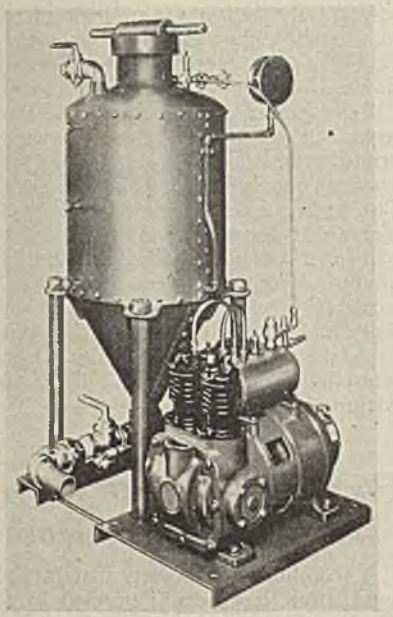
Convenient to Run or Move

Centralized Pneumatic Greasing Station

The line of safety lubricating appliances for use in the power plant and industrial plant fields has been extended by the Keystone Lubricating Co., Philadelphia, Pa., through the addition of the central pneumatic lubricating unit illustrated. The unit is designed for feeding grease through one or more header lines with connecting leads to practically any number of bearings and at varying distances from the unit up to 300 ft.

The pressure unit consists of a conical base grease tank and an automatically controlled motor-driven air compressor mounted on a common base. The compressor is regulated to maintain the pressure between the limits of 170 and 210 lb.

The tank is made from ⅜-in. steel plates, with the seams riveted and electrically welded. The discharge is connected at the bottom or the conical base and the tank will discharge from 83 to 100 per cent of its contents, depending upon the density of the grease used.



Greases Bearings from a Central Station

Three telltale petcocks are provided on the side of the tank for indicating the various grease levels. A 1-in. connection is provided at the top of the tank to permit filling the tank by pumping the grease directly into it as well as a larger opening for filling with grease which cannot be pumped.

A converter cup designed to maintain a pressure on a section of a system feeding a number of bearings is generally placed at a distance from the main pressure unit and adjacent to the machine or group of bearings being lubricated. In addition, a pressure reduction valve is inserted in the lead line at each bearing and is adjusted to give proper feed of grease for the type of bearing being lubricated.

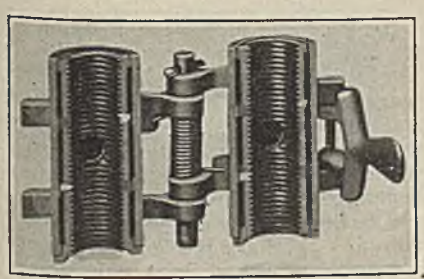
The lubricator units are made in two sizes, with a grease capacity of 150 and 450 lb. respectively.

Interchangeable Boxing Has Removable Lining

An electric coal-drill boxing made in interchangeable halves with removable lining is being marketed by the Hardsocg Mfg. Co., Ottumwa, Iowa. The linings are made of malleable casting of uniform thickness and density or can be had in phosphor bronze at a slight additional cost.

The halves are notched so that they interlock snugly, preventing end motion and adding materially to the life of the threads. The inside of the boxing is reamed to a standard size and the linings machined on the outside, insuring close fit. The boxing is so designed as to be interchangeable with other makes furnished on some of the best known types of electric coal drills now in use. Patents are pending on this boxing.

Snug Fit and Even Wear



Reach the Wide Places With Flexible Rail

Wide places may be easily cleaned up with a single track if the Clarkson flexible rail, manufactured by the Illinois Power Shovel Co., Nashville, Ill., is used. This device was originally designed to enable a track-mounted machine to clean up a wide room.

Easily Laid or Dismantled

The "rail," shown in the illustration, is composed of small cast-steel sections with stop ears attached, which rest in chairs mounted on crossties. Upon moving the track the inside sections contract and the outside lets out, forming a uniform curve. It is asserted that 2 ft. of this "rail" in a track section 20 ft. long will allow loading 8½ ft. on each side of the center.

Automatic Spark Control Saves Fuel

The Climax Engineering Co., Clinton, Iowa, now offers for sale on its heavy-duty industrial engines a new automatic spark control. This device operates from the suction in the intake manifold, and as the variation in pressure is proportional to the load, the ignition is always timed correctly. There is little loss of power and the fuel consumption is lowered. Spark knocks are eliminated and wear on bearings is reduced.

Two-Filament Mine Lamp Gives Adequate Light

A new two-filament incandescent lamp for miners has been developed by the engineers of the General Electric Co. at the National Lamp Works, Cleveland, Ohio. The lamp fits into the reflector, which is fastened to the miners' cap and assures adequate illumination throughout the day. The major filament, giving 14 beam candlepower of light, is used until it fails, after which the current is turned into the low candlepower emergency filament by a switch attached to the side of the reflector.

New Lamp Ready for Service

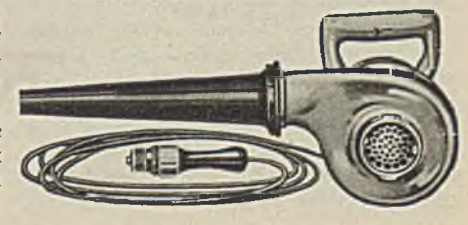
This enables the worker to finish his day's work without the necessity of getting a new lamp.

Small Electric Blower Is Super-Powered

For blowing destructive dust out of motors, machinery, shafting, etc., with extra powerful blasts of clean dry air, a super-powered portable type of small electric blower is announced by Breuer Electric Mfg. Co., Chicago. It is called Breuer's ball-bearing Tornado portable electric blower No. 6 and is equipped with a ⅓-hp. G.E. motor mounted on Norma precision ball bearings which require no oiling. It weighs only 7 lb. and requires no installation. Twenty feet reinforced cord and separable steel-covered plug with wood handle connects the "Tornado" to any electric socket.

The manufacturer asserts that this

Tornado Blower Makes the Dust Fly



blower develops greater pressure and delivers a larger volume of air at higher speed than any other type of blower of similar size, weight and cost now on the market. The extra power has been obtained through efficient design, and blasts of air with ample velocity and volume to safely dislodge dust is assured. Removing dust and foreign matter from motors and equipment reduces friction, saves power, lowers fire hazards, prevents "shorts" in motors, lessens repair costs, adds life to plant equipment and contributes to uninterrupted operation. Suction attachments and a dust bag may be obtained for converting the "Tornado" into an electric suction cleaner to remove dust from corners, motors and machines.

Miners' Cap Includes Eye Protectors

The "Antaxicap," a miners' cap with "safety eye protectors," manufactured by the Wilkes-Barre Cap Mfg. Co., Wilkes-Barre, Pa., embodies a quick and easily applied means of eye protection.

Certain Protection for the Eyes

The "eye protectors," which are the main feature, remain permanently attached to the cap and are easily shifted from inoperative to operative position. They are adjustable and can be made to fit the face. The eyes are protected from flying particles of coal, glass, wood or metal.

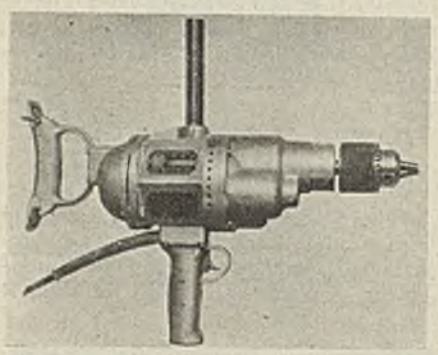
New Testing Sieve Has Rounded Corner

A new testing sieve equipped with a special joint which is claimed to be an improvement over the old type, has been developed by the Newark Wire Cloth Co., Newark, N. J. An important advantage of this sieve is that the inside cover is rounded instead of sharp. As a result the corner does not become filled with material, and accuracy and quick work are assured.

All soldering is done on the outside —a decided advantage — and screen cloths can readily be replaced. These sieves are made in 3, 5, 6, 8, 10 and 12-in. diameters and in accordance with U. S. Bureau of Standards specifications, adopted as standard by the American Society for Testing Materials.

Powerful Electric Drill For Hard Service

The new ¾-inch heavy-duty portable electric drill recently put on the market by Black & Decker, Towson, Md., was designed to meet the constantly growing need for a powerful drill of ¾-in. capacity to take straight-shank drill bits.



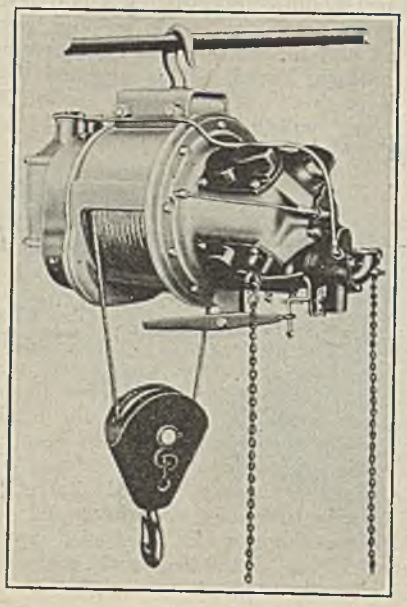
Husky Drill for Heavy Work

This drill is equipped with an exceptionally powerful universal motor, operating on direct or alternating current and the armature and spindle thrust are mounted on ball bearings. The 3-jaw geared chuck uses straight-shank bits, and the drill will readily drill holes up to ¾-in. in diameter in the toughest steel.

Air Hoists Embody New Features

A line of CP air hoists embodying several new distinctive features is announced by the Chicago Pneumatic Tool Co. The three sizes now available have a capacity of 2,000, 3,000 and 4,000 lb.

Has a Speedy Lift

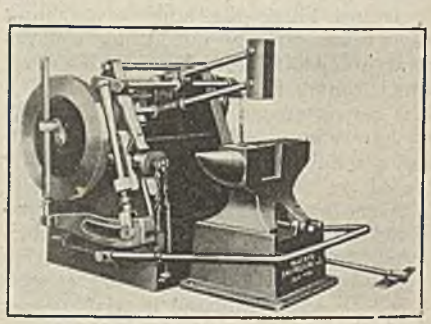


respectively and have an inclosed type load block. The motor is four-cylinder, single acting and practically vibrationless.

Being unusually compact, these hoists require less headroom than customarily needed. A balanced-type control valve assures smooth and positive control. The lifting speed has been considerably increased; for example, the 1-ton size will lift 2,000 lb. at a speed of 40 ft. per minute. Other features include case-hardened steel reduction gears, a crankshaft that runs on large-size ball races, a brake drum lined with Johns-Manville asbestos brake lining and Alemite lubrication.

Husky Blacksmith Helper Replaces Anvil Gang

A combination power hammer and hand anvil has been perfected by the Blacker Engineering Co., New York City. The hammer is designed to replace the usual striker or anvil gang and will deliver any strength blow from a mere tap to one four times as heavy as a hand sledge. A direct geared link motion drive furnishes positive control.



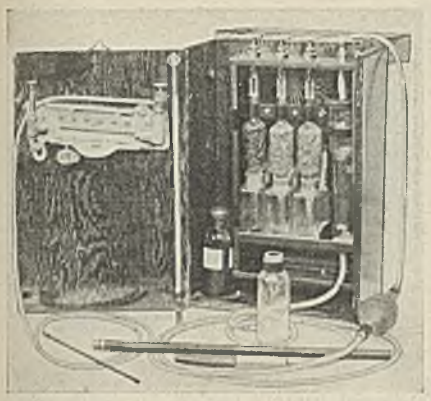
Eliminates Blacksmith's Helper

The hammer head travels from end to end across the anvil and strikes a flat, straight blow at all times. No special tools are required other than the regular hand tools. The whole installation requires much less floor space than is taken up by the regular anvil and human striker. The helper is eliminated and the blacksmith, working alone, is able to handle more jobs and work larger stock.

Flue-Gas Test Set Shows Combustion Efficiency

An improved portable combustion test set has been placed on the market by The Hays Corporation, Michigan City, Ind. The idea has been to offer a simple and convenient case of instruments for the quick determination of combustion efficiency and the cause and location of boiler trouble.

This set consists of flue gas analyzer, flue gas thermo-gage and draft gage compactly arranged in an oak carrying



The Combustion Compass

case. The analyzer is either single-chamber style for carbon dioxide only, or three-chamber style for carbon dioxide, oxygen and carbon monoxide. A CO_2 test can be made with this instrument in 30 seconds and a complete determination in less than 4 minutes.

The draft gage, which is mounted on the inside of the door, is of the inclined-tube type with a micrometer screw for leveling. The scale is movable for convenience in setting the zero opposite the end of the oil column and a needle valve is provided to lock the oil in the oil well while the set is being transported. The scale has a range of ½-in. water column but an auxiliary spirit level can be added to increase the range to 1 in., the scale reading to be multiplied by two when the auxiliary level is employed.

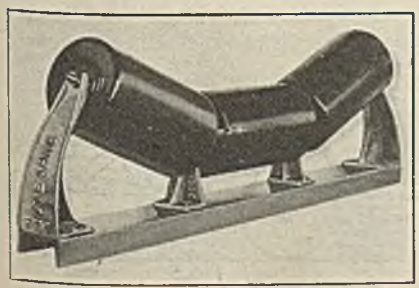
The thermo-gage is a small portable indicating pyrometer with the necessary lead wire and special alloy thermo-couple. This instrument has a pointer which indicates the temperature at the tip of the thermo-couple. The case measures only 6½x11x17 in. and the total weight is less than 20 lb.

New Belt Conveyor On the Market

A new Rex-Stearns belt-conveyor carrier has just been announced by the Stearns Conveyor Co., Cleveland, Ohio. for mounting its pressed steel and chilled rim cast-iron idler units.

Several new features are a part of the design, including much stronger supporting bracket of certified malleable iron. The space between idlers has been reduced to ⅝ in., lessening the tendency of the belt to "crease" with accompanying wear. The carrier may be obtained in the following sizes: 18, 20, 24, 30 and 36 in.

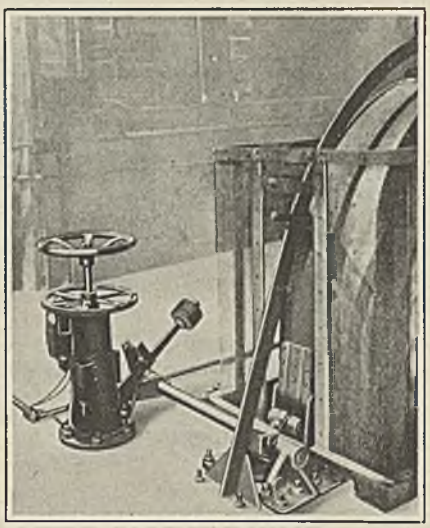
Belt Conveyor Idler



Control Rotating Stator By Push-Button

An automatic brake announced by the General Electric Co. for use with its super-synchronous motors eliminates the necessity for manual braking of the rotating stator. All desirable features of hand braking are said to be retained.

The brake mechanism consists of an upright standard which supports a vertical shaft. The lower part of this shaft is threaded. When it is revolved it transmits motion, through a trunnion block, to a series of levers attached to the brake band. The driving motor for the brake is mounted on the side of the standard and is geared to the screw shaft. A wheel is mounted on the end of the shaft so that hand operation may be obtained at any time.



Motor-Operated Automatic Brake on Super-Synchronous Motor

When the brake is being released the trunnion block travels upward on the screw and is stopped by the tripping of a limit switch when sufficient clearance has been obtained between the brake band and the motor frame. In tightening the brake the trunnion block moves down on the screw, automatically applying tension to the brake band through the combination of levers and weights until the action is topped by a limit switch. It is impossible for the brake to apply more torque than the amount corresponding to the weights on the brake lever. By adjusting these weights it is possible to vary the starting time of the motor from 5 to 40 seconds.

Complete Rock-Dusting Is Now Possible

Rock-dusting may be carried to back entries or aircourses, the development entries beyond the trolley wire and up into rooms by using the new high-pressure rock-dust distributor marketed by the Mine Safety Appliances Co., Pittsburgh, Pa. The machine will force dust through 500 ft. of 3-in. hose, and 12 to 15 tons of rock dust may be distributed in a haulage entry in an 8-hr. shift.

Dusts the Inaccessible Places

A rotary positive-pressure blower is used instead of a fan, which adds much to the efficiency of the unit. Simplicity of design and rugged construction are features of this machine.

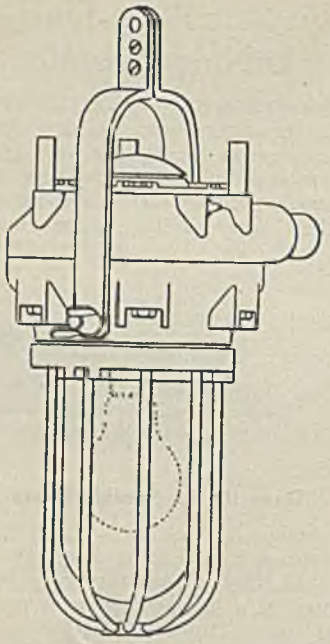
Air-Driven Lamp Shown In England

At the last annual exhibition held by the British Physical Society in London, the M. L. Magneto Syndicate, Ltd., Coventry, England, exhibited an interesting pneumatically driven miners' electric lamp. The instrument is self-contained and consists of a compressed-air turbine driving an electric generator, and supplying current to a metal-filament lamp.

Particular attention has been paid to the elimination of any fire risk; the generator takes the form an an alternator with a revolving field magnet, so that there are no rubbing contacts or brushes carrying current, which might cause sparking. The whole of the generator casing and the protecting glass which covers the electric bulb is in communication with the exhaust side of the turbine and the outside atmosphere cannot obtain access to the interior of the lamp when the latter is running.

A further safeguard consists of a flexible walled chamber—similar to that of an aneroid barometer—which carries a contact forced by a spring against another contact on a fixed base; the contacts are across the terminals of the generator, which is, therefore, normally short-circuited. The inside of the flexible chamber is maintained at atmospheric pressure, the outside being subjected to the excess pressure in the protecting glass of the lamp.

When the lamp is working and there is excess pressure in the protecting glass the contacts are separated and the lamp



Compressed-Air Turbine Furnishes Light

can light; any failure of the excess pressure, due to removal or breakage of the protecting glass, however, immediately short-circuits the generator. As a protection against any accumulation of gas in the protecting glass or in the body of the lamp a small hole communicates from this point to atmosphere, so that whenever the lamp is running a steady stream of scavenging air passes through the whole lamp.

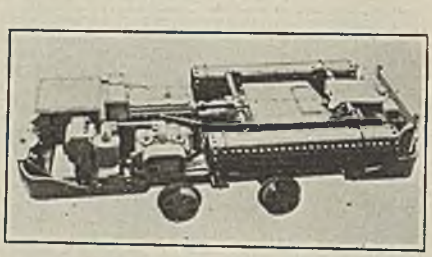
To prevent the lamp being overrun, should the air pressure rise unduly or the turbine reach an excessive speed in the case of the bulb failing, a centrifugal governor is fitted to the turbine spindle. A special form of lamp also is available fitted with a reflector giving a concentrated beam, and the generator is designed for a 60-watt 50-volt lamp which is gas filled and will furnish between 90 and 100 c.p. The air consumption is about 10 cu.ft. per minute at all pressures above 40 lb. per square inch. The weight of the complete lamp is 16 lb.

Plenty of Air With This Low-Type Compressor

To meet conditions of height imposed by thin seams, the Sullivan Machinery Co., Chicago, designed a mine-car air compressor known as type "WK-22." Every effort has been made to reduce the over-all height of the machine and at the same time furnish a reliable source of compressed air at low cost for power, attendance and repairs that will stand up under mining service in thin seams. This new Sullivan compressor, therefore, affords to thin-seam operators facilities for all types of underground rock drilling, operating isolated mine pumps and furnishing air for cement-spraying equipment, paint sprays and rock-dusting machines at advantageous outlay.

The "WK-22" compressor unit consists of a two-cylinder single-acting air compressor operated by an electric motor and equipped with two receivers or air tanks, the whole being substantially mounted on a steel frame and truck with steel wheels for moving from place to place. The unit is so designed that all moving parts are inclosed and is equipped with an air filter. A simple unloading device permits economy in power consumption, and improved lubrication and cooling systems are provided.

Either a.c. or d.c. motors may be had, and in the approved type machine, the motor, controller and all electrical apparatus have successfully passed Bureau

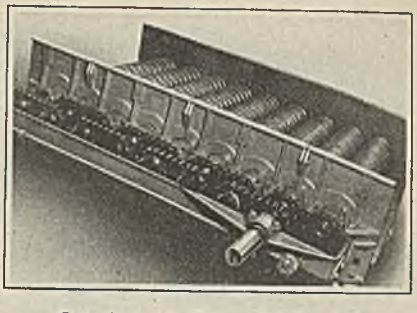


Assures Air in Thin Seams

of Mines requirements. The over-all length of the machine is 11 ft., the wheelbase is 32 in., and the over-all height above the rails is 32½ in. with straight axles and 28½ in. with drop axles.

Screening-Feeding Action In Live Roll Grizzly

Both screening and feeding action is a feature of the S-A live roll grizzly made by the Stephens Adamson Mfg. Co., Aurora, Ill. This machine consists of a series of grooved rollers rotating in the same direction. The grooves in



Grizzly with Drive Mechanism Cover Removed

adjacent rollers match to form round openings to pass the desired size product.

The grizzly operates on a slight incline and, working from the top roll down, each roll rotates faster than the preceding one. These machines are built in widths of 24 to 60 in., with capacities ranging from 120 to 270 tons per hour of material weighing 100 lb. per cubic foot. They can be furnished with rolls to pass material from 1 to 3 in. in diameter.

Cars Coupled Quickly

Hand coupling is eliminated by a car coupler invented by J. P. Whitsell, Nanty-Glo, Pa., and exhibited at the recent Cambria County Industrial Exposition. Fig. 1 shows the cars coupled together. In Fig. 2 the link is shown raising the coupling hook by means of the spring-actuated cam, and in Fig. 3 the coupling pin has been raised clear up by hand and locked in position by the locking cam. When the car is pulled away this cam is tripped and the coupling hook allowed to fall to the coupling position.

This device allows automatic coupling and thus reduces the danger to the brakeman or trip rider. The cars must be uncoupled by hand.

Automatic Coupling Device

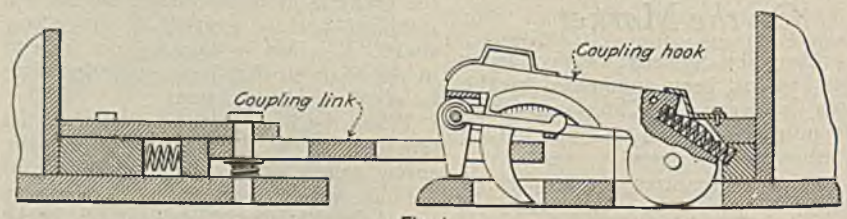


Fig. 1

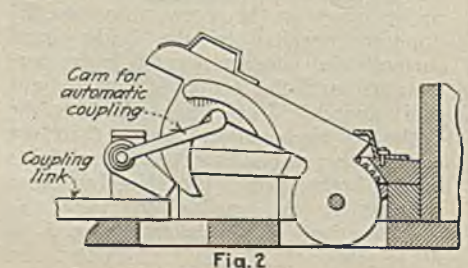


Fig. 2

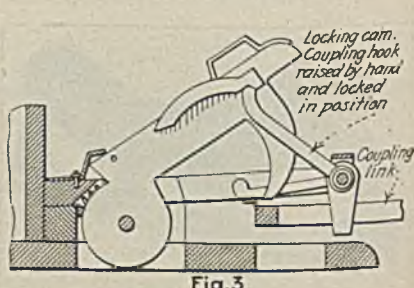


Fig. 3