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Hostages to Ignorance

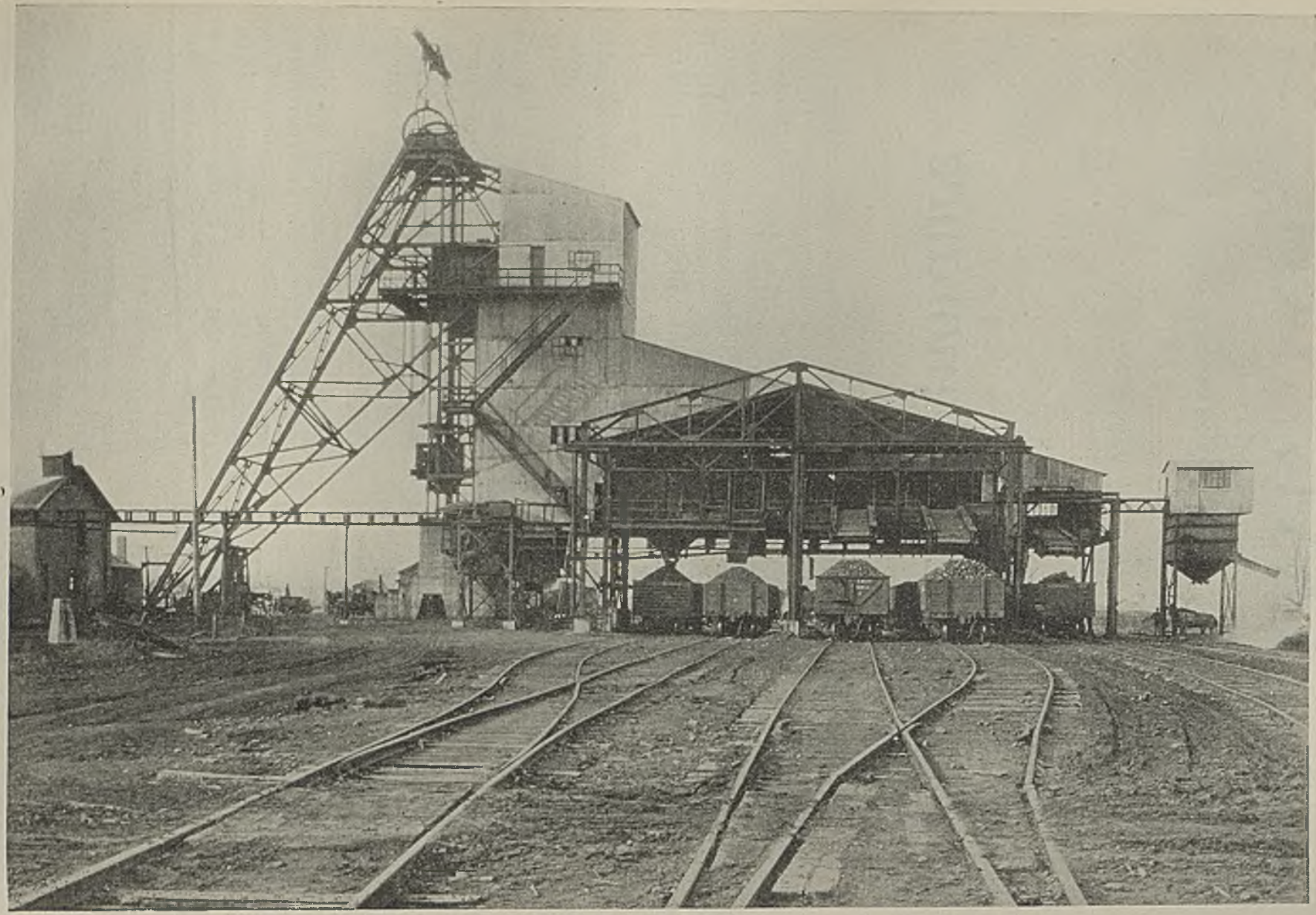
WASTE IN DISTRIBUTION is still a major challenge to industry and to the nation. The engineering control which has made such great headway against preventable wastes in production and manufacturing processes has had little opportunity to function in the field of distribution. The basis of engineering, irrespective of the direction its specific application may take, is factual. But the developed factual basis for an intelligent engineering study of distribution in many industries is wholly inadequate —and waste continues unchecked.

BITUMINOUS COAL is representative of those industries in which the field of distribution is shrouded in a fog of ignorance. It is one of that group of commodities which, to quote from the address of Secretary of Commerce Lamont before the Merchants' Association of New York last month, "we practically lose sight of statistically once it is produced." Published basic data on distribution and consumption are either so old or so fragmentary that dangerous and costly guesswork too often must substitute for facts.

SO LONG as this situation exists wasted efforts which increase sales expenses and eat into profits hardly can be avoided. Heavy sales artillery will be wasted on lone consuming outposts and pop-gun campaigns directed against important markets. Traveling salesmen will tread upon one another's heels begging the business of a plant which might better be left to a local retail distributor. And, directly or indirectly, the public will foot the bill for all this lost motion and misguided energy.

IN THE ABSENCE of a common public reservoir of information a few of the largest companies can and will make private surveys. But the results of these studies will be jealously guarded, and each independent survey means a duplication of effort and expense. What is needed is a broad study that will take in all coal distribution and will make its facts available equally to all who care to examine and be guided by them.

SUCH A SURVEY could be made most successfully and completely by a government agency working in close co-operation with the railroads. Here is a real opportunity to do a real job that would benefit both the coal industry and the vast coal-consuming industrial public. Until this job is undertaken, workers in the field of coal distribution must remain hostages to ignorance, and the buyer must continue to bear the toll of preventable waste.



The Franklin Mine—One of the Illinois Operations Using Pit-Car Loaders Underground

[See page 421]

CHANGE *in* *Mining Layouts Is Now* Mechanization's Greatest Need

By Alphonse F. Brosky
Associate Editor, Coal Age

HAVE American mining men accepted from their antecedents in the room-and-pillar system a heritage which is passing the stage of usefulness? From the standpoint of mechanization this seemingly is so, for clashes are common in attempts to dovetail the new with the old. The reason is not that the room-and-pillar system does not possess merit—it does—but rather that the principles upon which it is based, the conditions which it creates and the demands which it exacts are in general out of harmony with the fundamentals of utmost machine utilization and the ideals of workers' efficiency, safety and general well-being.

Befitting the achievements of their fathers, the results accomplished by mining men of the present generation in applying machines to room-and-pillar layouts are creditable. But, as gains verge closer to the limit of possibilities of betterment in this application, greater improvement must become increasingly difficult. As the mechanical performance of the machines is further improved the task capacity will be further increased, with the result that, due to the limited task available, the ratio between the time of work accomplishment and the time of idleness and moving combined will decline rather than rise.

The only outlet sufficiently expansive to embrace the growing needs of mechanization appears to be a change to layouts giving fewer and bigger working places. This change will come as the industry loses its lingering attachment for the old and gains faith in the new mining systems. It will be forced by the influences of modern tools, advanced knowledge and developed directive capacity, an abundance of which the industry already possesses.

Changes need not necessarily be drastic and in character may range between the room-and-pillar system and panel-longwall mining, conditions being the governing factor. However, the more the nature of the system differs from room-and-pillar mining and the more it approaches panel-longwall mining, the more will it be in agreement with sound principles of mechanization. It is altogether unlikely that true longwall mining will find a place in this country. Like the room-and-pillar layout, true longwall does not adequately meet mechanization demands.

This is merely a statement of fact as to the relation of mechanization principles with the characteristics of mining systems. It does not mean the author flatly proposes that every operation should be established on any one system. Too many factors, both economic and physical, influence final judgment to allow of any decisive opinion. Conditions governing the methods of working the No. 6 seam in Illinois, likewise the difficulty of handling drawslate roof in the Pittsburgh seam in Pennsylvania, illustrate the necessity for a liberal view of machine adaptation.

WHEN longwall methods are broached in the presence of adherents of the room-and-pillar school, the latter almost invariably voice their opinion by saying, "It can't be done; at least not under our conditions." Vague, indeed, is the meaning of "conditions" in this rejoinder. Does the reply refer broadly to conditions obtaining in all the coal fields of the country or strictly to conditions in one seam or one mine? How is it known that longwall will not work? Is the opinion based on actual experience? With rare exceptions, it is not. Smith hears Jones say longwall methods are altogether impracticable; Smith tells Doe; Doe tells Hancock, and so the opinion has spread from mouth to mouth.

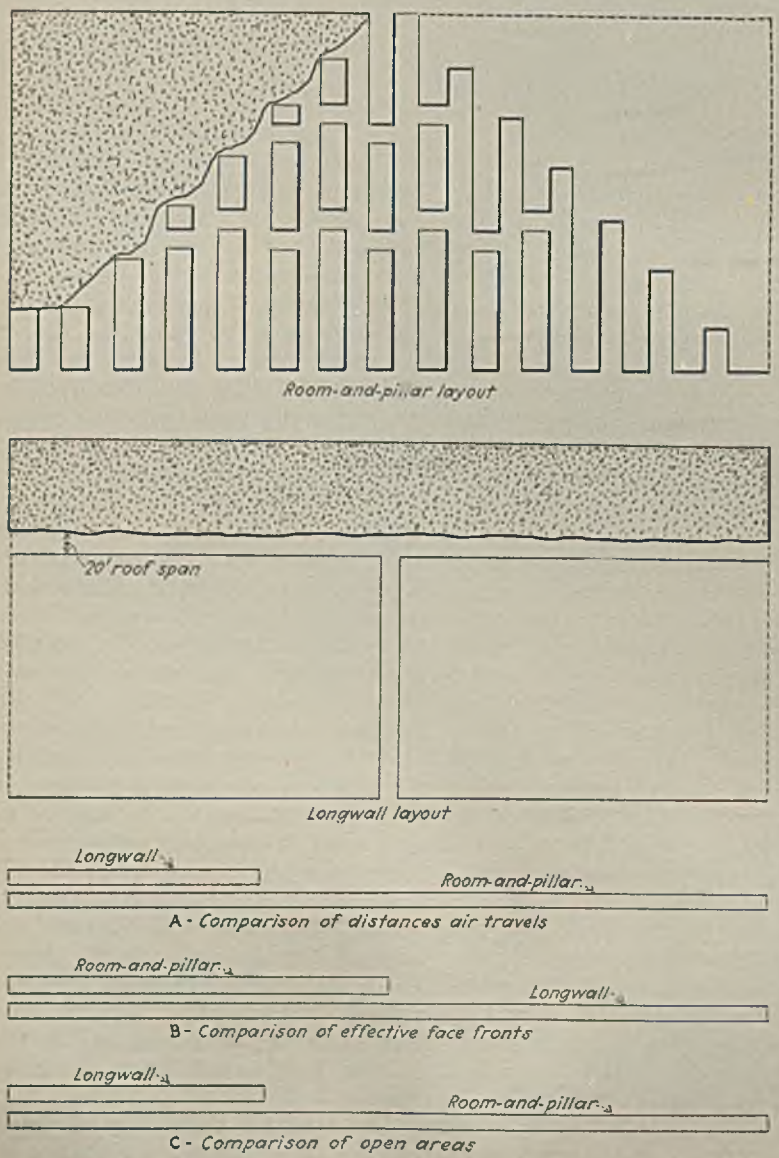
The truth is that longwall gives promise of economical application to

many seams in this country. Opinion to the contrary should not be based on the results of short-lived attempts to apply the longwall system. It may take many years to apply the room-and-pillar system successfully to some hitherto unmined seam of coal. Accordingly only experience is a fair basis for determining the relative merits of longwall methods.

Close adherence to the room-and-pillar system under a variety of conditions in this country suggests the prevalence of a fear of the roof in more extended workings. That fear has been quickened by the frequency and regularity of accidents due to falls of roof. So long as this fear remains roof will continue the master over man and dictate to him what systems shall or shall not be used. It should not be forgotten that roof conditions that exist in the room-and-pillar system are not those that will be encountered in wider flung mechanized layouts. Roof conditions are altogether likely to be better in longface layouts. Longwall methods will give the worker considerably better protection from roof falls and other dangers lurking in present mine layouts.

THE claim is made that mechanization brings about greater concentration and yet in many mechanized layouts, most notably where conveyors are used, only one or two room places on an entry are worked at a time. Such arrangements do give greater concentration of machines and men in each working place but they do not provide a much greater yield of coal from the entry section. That is not concentration in the true sense of the word. Concentration, being a relative term, is best measured by a comparison of rates of production from a unit of developed territory, that is, from a working section. If 200 tons of coal is taken in two full shifts from a working area which formerly produced 100 tons when mining was conducted during only one shift and perhaps a part of another, it cannot reasonably be said that concentration has been improved 100 per cent. Concentration in its relation to mining is not clearly defined in the minds of all who are planning and developing mechanization systems.

Perhaps no one factor has prevailed more against enterprise in the developing of new mining systems than the belief that the pillar or fracture line must be maintained on the customary angle of 45 deg., regardless of conditions. That disposition of the mining front is deemed advisable in the driving of rooms even where pillars are not extracted. That inclination is believed necessary regardless of the thickness of the seam, the structure and hardness of the coal,



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These Comparisons Mean Something

From layouts of the two systems under consideration, room-and-pillar vs. longwall, drawn to scale and each embracing a unit area, data were taken from which graphic comparisons were made. The area taken for each layout is roughly three acres, the tract measuring 250x500 ft. In each case the places were established broadside of the tract. The tract accommodates fourteen rooms, each 15 ft. wide on 35-ft. centers, in a concentrated room-and-pillar layout, or two faces, each 250 ft. long, in the longwall layout. Interpretation of the graphic comparisons follows:

A—Before rejoining the main current of the split the air in the ventilation of the room-and-pillar layout by the shortest possible route travels over three times the distance covered by the air sweeping the longwall layout in an equivalent area. In the room-and-pillar layout only a small proportion of the air in the split reaches the faces; in the longwall layout all of the air is effective.

B—Granting that a cut can be taken from the full width of every retreating pillar and every advancing room in the room-and-pillar layout, and that a cut can be taken from the faces in the longwall layout each day, the combined length of effective faces in the room-and-pillar layout is one-half the combined length of faces in the longwall layout.

C—The area of standing rooms and crosscuts in the room-and-pillar layout is three times as great as the open area along the faces in the longwall layout. In this calculation the writer allowed a roof span of 20 ft. to project over the longwall faces.

These are but a few of many comparisons which can be made in favor of longwall. Are not these three advantages alone sufficient to offset the higher cost of timbering in longwall layouts?

* * * *

the nature and thickness of the cover, the character of the roof, the nature of the bottom, the width of the rooms and pillars and the length of the rooms.

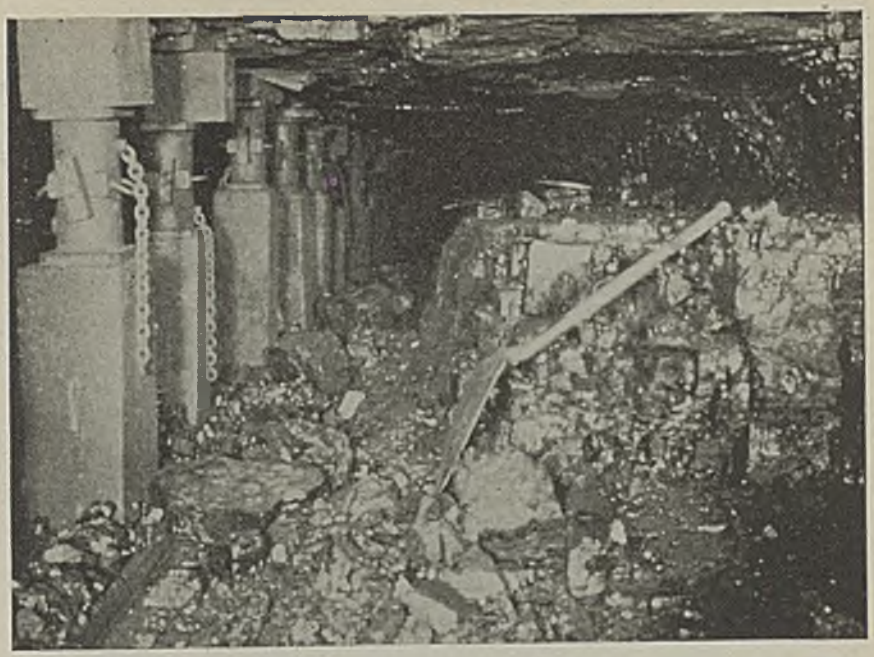
In rare instances the pillar line has been established at an angle of 30 deg. with the room entry, and results achieved are comparable with those that would be obtained were the more acute angle used. The 45-deg. line was chosen years ago and is accepted today for reasons that are open to question. It provides steps of coal at the ends of the pillars, it is true, but does the throat formed by the step between two adjacent pillars actually protect the men working in it any more than a straight front adequately timbered?

The 45-deg. line causes the roof load to be imposed diagonally across the face and butt cleats of the coal, but is that desirable? Certainly it causes roof loads to accumulate and to ride over pillar edges, thereby influencing the occurrence of falls at the face, at the end of the pillar or back from these places and frequently on the entry from which the rooms are turned. That, in a large degree, accounts for many of the fatalities from roof falls. Establishing the 45-deg. line is like borrowing from Peter to pay Paul; the benefits derivable from it appear for the most part mythical.

Staunch advocates of the room-and-pillar system defend it chiefly on the ground that it demands less timbering than other systems. The defense is weakened by the fact that timbering practice in the room-and-pillar system has not in general been sufficient to guarantee adequate protection from roof falls. As mechanization proceeds the tendency is to use less and less timbering in room-and-pillar work because timbers interfere with the maneuvering and moving of the equipment. Dangers from roof falls consequently tend to increase.

Is this a fair basis for condemning longwall methods? The system does require close timbering for its success; it does compel men and machines to work close to the coal. But in so doing it eliminates wide, inadequately supported, dead-end places and insures safety. Until it has established a fair basis for comparison, the industry cannot sit back complacently and proclaim its arrival at the safest and most economical system of mining coal.

Should not American mining men reflect on experiences and practices of foreign countries in regard to longwall mining? They can learn much from their fellow mining engineers across the sea, just as Europeans can profit in large degree by considering certain American practices.



Longwall Characteristics Meet Mechanization Needs

The holding forth of European mining practices as an argument will draw protest as it always has. Again it will be said conditions there are vastly different from those here. The main difference really is that geologic conditions in Europe are more difficult, notably in that the seams mined are thinner and lie at greater depths. The same arguments advanced to justify room-and-pillar mining here are applicable there. In England, for instance, mining men know both systems, as they use both, but wherever possible they give preference to longwall. Their supporting arguments deserve close study.

Mining methods on both sides of the Atlantic are likely to undergo a change as more machinery is introduced underground. The change will be worked from two ends toward the middle; that is, there will be drifting away from true longwall in Europe and from room-and-pillar in the United States in a convergence toward panel longwall. Machine adaptation will compel these changes.

If room-and-pillar mining it must be, why not simultaneously drive up four, six, eight or as many rooms as desired on a front parallel with the entry and in the same manner bring back the complementary pillars? That arrangement will work satisfactorily under a fairly wide variety of roof conditions after refined details are determined and the workers learn their jobs by experience. After the system has been tried and found successful, progress will dictate a gradual increase in the width of pillars, in which case the rooms will no longer be rooms but entries, and lo! there will be evolved experience and practice in panel longwall mining or some modification thereof.

One large company has redesigned the layout of one of its mines to take advantage of the substantially greater concentration which this scheme gives. The particular mine in question is in one of the Southern mountain regions under extremely heavy cover. The immediate roof is fair. As originally worked rooms were driven long, narrow and in accordance with the 45-deg. fracture line theory. Much trouble was experienced in getting coal by this system owing to the concentration on the pillars of pressures resulting from the method of working. The resultant pressure was sufficient to cause occasional diminutive bumps or outbursts of coal from the faces.

In the redesign of the layout the rooms were shortened to a length of only 250 ft. Not one room is driven until after the room entry is fully developed. Then all projected rooms on that entry are started simultaneously and driven up on an even front to their limit. On the retreat all room pillars on that entry are attacked simultaneously and brought back on an even front.

(Turn to page 412)

Headframe, Horden Colliery

HORDEN

One of England's Crack Collieries

By J. H. Pierce

Associate, Stuart, James & Cooke, Inc., New York City

HORDEN COLLIERY, Castle Eden, County Durham, England, is owned by the Horden Collieries, Ltd. To visit it is a real pleasure, because a mining man at once senses that he is seeing the best that brains plus money can evolve. He will immediately be impressed with the fine layout, the substantial character and architectural effect of the surface plant and with the ability of the official personnel.

It is particularly interesting to the American mining man, for of the mines I have seen abroad it is one of the few that lends itself readily to a comparison with American mines. Here is a mine opened under the prevailing European methods of multiple shifts, using small cars hoisted on double-decked cages. Had it been opened in America it would have employed single-shift hoisting with large cars hoisted on cages, or perhaps skips.

One finds room-and-pillar and longwall workings both in operation, one of the best wet-washing systems in the world being replaced with air tables, together with coke ovens and distillation plant, all of which features just now are the subject of much discussion among the mining fraternity in America.

The colliery is working three seams of coal, the Main coal seam at a depth of 858 ft., the Low Main at 1,080 ft., and the Hutton seam at 1,209 ft. These seams dip approximately 3 deg. to the east and extend for miles out under the North Sea, and their respective thicknesses are 3 to 4 ft. 6 in., 3 to 3 ft. 10 in. and 4 to 5 ft. 6 in.

The colliery is opened by means of three circular shafts, one of which hoists 2,800 tons, the other 2,000 tons and the third or upcast shaft 1,200 tons in two shifts, or nineteen hours. Two of the shafts are 20 ft. in diameter and serve as downcasts. The East Shaft, which is the upcast, is 17 ft. in diameter.

This colliery hoists 6,000 tons per day, or an average of 1,500,000 tons per year. The tonnage underlying the 5,373 acres in the area as originally defined was 110,000,000, indicating a plant life of 73 years. Due to certain changes of boundaries the remaining life is figured at 60 years. This brings out the first interesting thought for the American mining man, namely, that European mines are designed for a life approximately 2½ to 3 times as long as American mines.

At Horden Colliery this probably can be justified, for the mine is located near the shore of the North Sea. It is now working under the sea at a distance of two miles from the shore line, and after proceeding another mile the royalty payments cease, and it will be possible to mine out probably an additional two miles

of coal for which nothing will be paid. In general, however, I believe that European mines are designed for too long a life.

The determination of the economic life of a property must consider so many factors, financial, technical and practical, that one hesitates to talk in generalities without risking criticism from those who have specific properties in mind. However, it may be taken as axiomatic that so far as annual earnings are concerned the economic life of a mine increases with the increased cost of plant and equipment. If we compare the present value of the series of annual net earnings from properties having various capitalizations per ton of annual output we get quite a clear picture of the most economic life.

On the above basis, assuming a profit per ton the same in each case, and that Pennsylvania anthracite mines have a capital expenditure of $8 per ton of annual production, Great Britain $5 per ton and American bituminous mines at $2.50 per ton, it would indicate that the mines in Great Britain should have a life midway between our anthracite and bituminous properties, if American practice is correct.

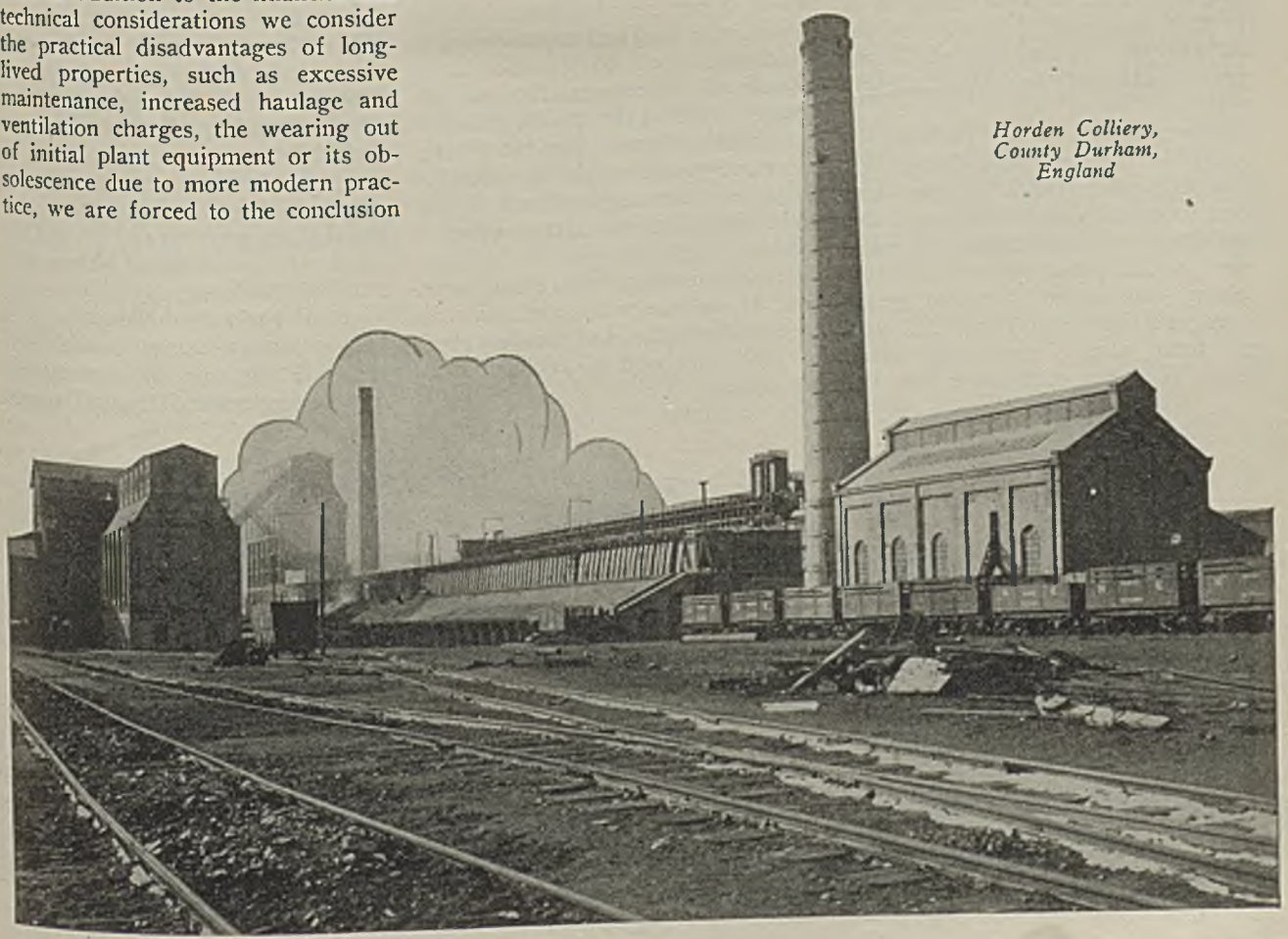
If in addition to the financial and technical considerations we consider the practical disadvantages of long-lived properties, such as excessive maintenance, increased haulage and ventilation charges, the wearing out of initial plant equipment or its obsolescence due to more modern practice, we are forced to the conclusion that, barring unusual circumstances, plant life probably should not exceed 35 years, or as a maximum 40 years.

Uses Both Longwall and Room Operations—Longwall Preferred Where Coal Is Less Than Four Feet Thick—Mines in England Planned to Last Two or Three Times as Long as Ours

It is interesting to note here that of the many mines figured by this company's engineers, with a wide range of investment per ton of annual production, none has exceeded the figures given. It was further of interest to me to note that many of the long-lived mines in Great Britain are now engaged in sinking new shafts to overcome the difficulties brought about by excessive coal reserves.

To return to a description of Horden Colliery, Fig. 2 will illustrate the main roadways, having two intakes and two returns. The main road in the Hutton seam has 30-in. brick walls on each side, and the top is supported by 8 x 6-in. steel girders on 36-in. centers. The clearance between walls is 12 ft. 6 in. and from rails to girders 7 ft. The traveling-way walls are 9 ft. apart with 6 ft. 6 in. vertical clearance. The unusually permanent character of these openings and their ample size indicate that the management of this property is farsighted in forestalling the high maintenance and ventilation costs that would otherwise have to be met during the later years of the life of the mine.

The main haulage system is an endless rope with a speed of two miles per hour and the cars are placed on the rope in sets of five. Inasmuch as the engine room is close to the



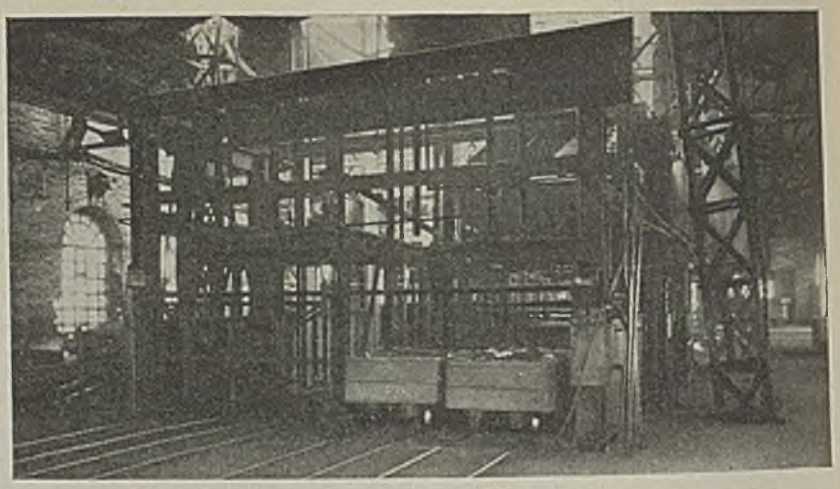
Horden Colliery, County Durham, England

shaft bottom, electric-motor drive is permitted on this rope system, but the auxiliary main and the tail haulages are driven by compressed air because of the gassy condition of the mine. As the face is more than two miles from the shaft bottom, a main-and-tail haulage has been installed in the traveling way, and the men are hauled to work in special cars holding twelve men each. There are twenty of these cars equipped with safety chains and brakes. The trip rider at all times can signal the engineer by means of a copper fork which is placed across two bare overhead wires. This man-handling system is a good investment as it saves a considerable portion of each workman's shift, which he would otherwise consume in walking.

As before mentioned, both long-wall and room-and-pillar are in operation. In the latter pillars are cut 132 ft. square and these pillars are then removed by slabs 12 to 15 ft. wide on three sides until the pillar is extracted. A recovery of 95 per cent is claimed for this method of operation.

IN the longwall workings the gate-ways are 87 ft. wide, and lifts are taken off on each side of the gateway. Sufficient rock is brushed to make pack walls 9 ft. wide on each side of the road gate and 12 ft. wide on the mother gate. A recovery of 97 per cent is claimed for the longwall workings.

Wherever the coal thickens to nearly 4 ft. it has been found that room-and-pillar yields cheaper coal than longwall, due to the expensive timbering and maintenance of road-ways in the latter system. At this colliery the output per coal getter averages 5 tons per day, and 1.51 tons per total worker employed, which record is 50 per cent better than the average of all of Great Britain. The average wages of all workers is $2.28 per day against an average throughout Great Britain of $2.32 per day.



Caging the Mine Cars

A table is appended giving general information as to production statistics and cost for various districts in Great Britain and in total for the third quarter of 1928, and it will be noted that the net loss for this period was 34c. per ton.

With the low wage scale now in effect, with labor extremely dissatisfied, with a loss per ton amounting to 7 per cent on their invested capital, with deep and expensive mines which are costly to lay idle during periods of depression, the coal operators of Great Britain are indeed in far greater distress than the American mine operator, who is entitled to whatever little comfort may be derived from having a companion in misery.

It is interesting to note that in the face of these adverse conditions the Horden Collieries, Ltd., made a profit in 1928, and paid a dividend of 2½ per cent.

Fig. 1 indicates how the coal from the North and South shafts are assembled to the tippler house. The coal from the third shaft comes in from the east side, and the full cars from all three shafts run by gravity through the weighing machines to the rotary dumps, thence by gravity to chain hauls which raise them sufficiently to continue by gravity to the hydraulic decking gear at the shaft.

Eight cars, or four cars per deck, are hoisted at each trip, and the hydraulic decking device, which is in reality two auxiliary cages on each side of the shaft so arranged as to be raised and lowered by a vertical ram, serves to permit the eight empty cars simultaneously to discharge the eight loaded cars.

The loaded cars pass to six rotary dumps which distribute the coal to the shaking screens, and all coal over 1⅝-in. size passes to the picking belts, while the undersize, which constitutes about 34 per cent of the input, passes to two Simon-Carves washer boxes each of 40 tons hourly capacity. After being crushed, the coal is stored

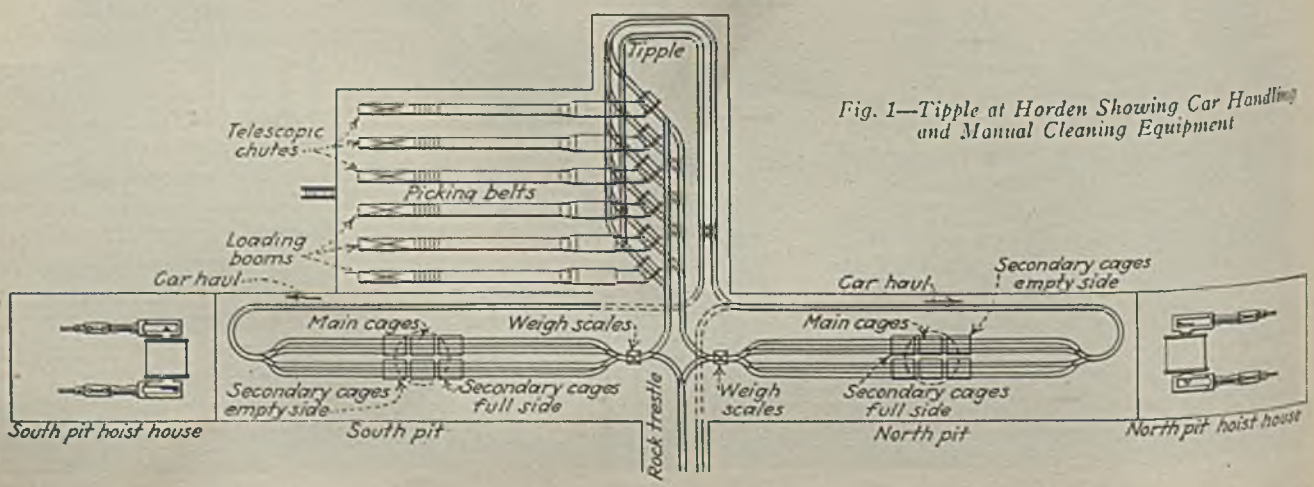


Fig. 1—Tipple at Horden Showing Car Handling and Manual Cleaning Equipment

in a 2,000-ton concrete hopper and is then sent to the coking plant.

The coking plant consists of 120 Koppers regenerative ovens which are fed by an electrically driven top-charging machine. The gases from these ovens pass to the byproduct plant. No description will be given of this plant due to space limitation, but the products derived from the coal treated are set forth in the accompanying table:

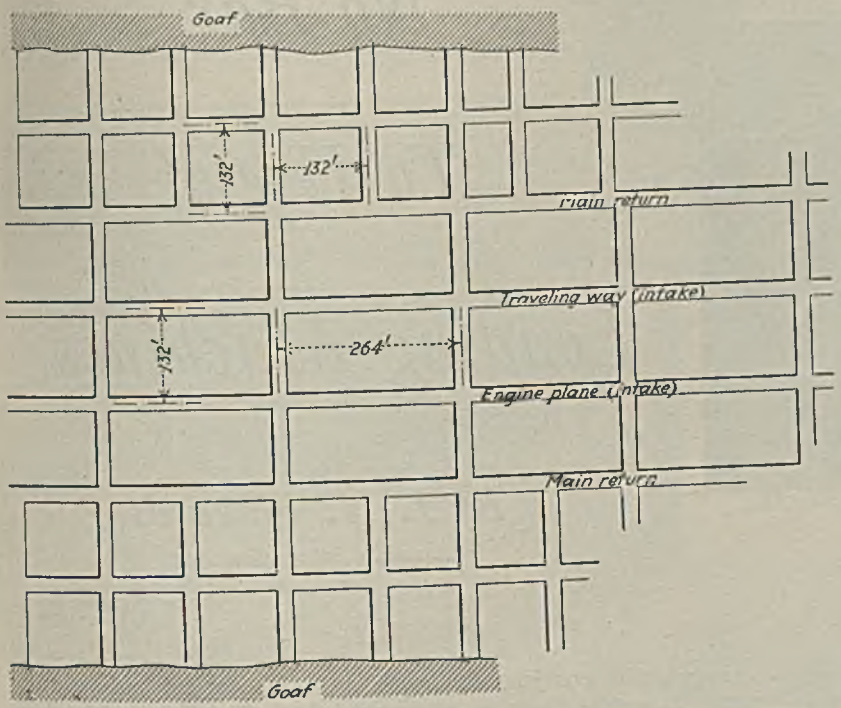


Fig. 2—Big Pillars Make for Safety and High Recovery. Quite a Commentary on American Small-Pillar Legislation

Output Per Ton From Horden Colliery Ovens

Gas	11,000 cu.ft.		
Coke	1,624 cu.ft.	@$4.50 per ton	$3.26
Ammonium sulphate	32 cu.ft.	52.00 per ton	.74
Tar	105 cu.ft.	7.75 per ton	.36
Benzol	2.8 gal.	.25 per gal.	.70
Value of byproducts exclusive of gas			$5.06

About 40 per cent of the gas produced is used to heat the coke ovens, the surplus being utilized in the manner now to be described.

The power scheme at this colliery is unique. The exhaust steam from Horden and Shotton collieries is used to drive two 1,000-kw. generators, and the surplus gas from the ovens is used to drive two 3,000-kw. generators, all of which are connected to the common mains of the Newcastle Electric Supply Co., which owns the generators mentioned, and it in turn sells back to the colliery company the power at 3½ mills per kilowatt-hour. If the colliery uses more power than these generators deliver it pays the central station 11 mills for the first 250,000 kw.-hr. used in a three-months period, 5½ mills for the next 1,250,000 kw.hr. and 4.5 mills for any additional. If the colliery company makes any excess power the central station pays for it at the rate of 0.6 mill per kilowatt-hour. The net resulting power cost to the coal company is 6 mills per kilowatt-hour.

Space will not permit a description of the fine hoisting and generating equipment, the modern washhouse and other auxiliary buildings and equipment, because I wish to describe a final feature of this plant of great interest. However, the accompanying illustrations will indicate the splendid type of construction. One illustration shows the surface landing arrangement at one of the shafts. Another the type of head-house construction and the third shows the coke ovens, screen-house, washery, storage pocket and byproduct plant.

Although the colliery has a perfectly satisfactory wet washing plant, a new air cleaning plant is being designed by the Birtley Iron Works, which uses the O'Toole patents, but with distinct changes in table design.

ITS reason for this is the desire to give its coke ovens coal of low moisture content. In order to utilize all the fine coal and at the same time eliminate the dust connected with air cleaning, the fine coal from the tables is collected for the firing of Babcock & Wilcox powdered-fuel boilers.

I predict that air tables will make their greatest progress along the line being followed at this colliery. The utilization of the dust under boilers is a commendable feature. In this regard and in the utilization of the exhaust steam the English mine manager is thinking ahead of the American mine manager. It has been my observation that power costs throughout Great Britain's mines are considerably lower than would be obtained in America under similar conditions.

I desire to express thanks to J. P. Hall, chief mining agent; C. A. Patteson, colliery manager, and A. B. Charlesworth, chief mechanical engineer, for their courtesy during my visit and their aid in enabling me to obtain the foregoing data.

Output, Costs of Production, Proceeds and Profits of the British Coal Mining Industry for the Quarter Ended Sept. 30, 1928.

Cost of Production per Ton of Product Disposed Commercially	Mining Districts 1	2	3	4	5	6	7	8	9	10
Wages	$2.15	$1.81	$1.96	$2.58	$2.41	$2.39	$2.61	$3.08	$2.63	$2.37
Stores and timber	0.39	0.37	0.40	0.50	0.29	0.32	0.43	0.45	0.42	0.39
Other costs	0.56	0.71	0.74	0.66	0.69	0.62	0.64	0.97	0.67	0.69
Miners' Welfare Fund contribution	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Royalties	0.14	0.13	0.13	0.17	0.10	0.09	0.09	0.14	0.13	0.13
Total costs	$3.26	$3.04	$3.25	$3.93	$3.51	$3.44	$3.79	$4.66	$3.87	$3.60
Deduct proceeds of miners' coal	0.02	....	....	0.03	0.02	0.02	0.01	0.03	0.02	0.02
Net costs	$3.24	$3.04	$3.25	$3.90	$3.49	$3.42	$3.78	$4.63	$3.85	$3.58
Proceeds Commercial disposals	2.96	2.71	2.98	3.49	3.16	3.22	3.61	3.97	3.50	3.25
Balance:	$0.28	$0.33	$0.27	$0.41	$0.33	$0.20	$0.17	$0.66	$0.35	$0.33
Debits	....	....	....	....	....	....	....	....	....	....
Credits	....	....	....	....	....	....	....	....	....	....

1 Scotland. 2 Northumberland. 3 Durham. 4 South Wales and Monmouth (August, September and October). 5 Yorkshire. 6 North Derbyshire and Nottinghamshire. 7 South Derbyshire, Lancashire, Cannock Chase and Warwickshire. 8 Lancashire, Cheshire and North Staffordshire. 9 Cumberland, North Wales, South Staffordshire, Shropshire, Bristol, Forest of Dean, Somerset and Kent. 10 Average for Great Britain.

BAD TOP *and* PARTING

No Bar To Use of Loading Machines

E. R. Ogle, Vice-President; Willington O'Connor, General Superintendent, and Dale Ferris, Mine Foreman, Discussing a Problem

By J. H. Edwards
Associate Editor, Coal Age

IN spite of unfavorable mining conditions, consisting of top which must be supported above the machines and a parting several inches thick, over one million tons has been loaded mechanically at No. 28 mine of the Ogle Coal Co., near Cass, Sullivan County, Ind. This was accomplished despite a sluggish market and unsettled labor conditions, both of which have prevailed much of the time since the autumn of 1924, when the first two loading machines were installed.

The mine is now completely mechanized and is shipping an average of 1,000 tons per day. Because of the presence of a parting consisting of 4 to 5 in. of fairly hard material located about 2 ft. from the bottom, careful picking is necessary on the tipple, but this extra preparation with mechanical loading is in no way hampered by equipment limitations, for the reason that the tipple was built for 4,800 tons per day with hand loading.

A picking crew of seven men remove refuse totaling 8½ per cent of the tonnage hoisted. It is estimated that in machine-loaded tonnage the tipple will successfully handle 40 per cent of its rating for hand-loaded coal.

Perhaps describing the mine roof as "uncertain" is a misnomer. It might properly be said that the 5 to 10 ft. of sandy shale overlying the coal is "certain" to come down in a short time if not supported. Practically all of the main entry is protected by timber sets or by combination timber and steel sets, and at room faces the men and machines are protected by two or three 6-in. steel beams of "H" section 20 ft. long.

The coal, which is the No. 4, has an average height of 66 in. In the mining, Joy type 5 BU loading machines are used exclusively. Rooms are driven 24 ft. wide and 270 ft. deep on 36-ft. centers. Barriers 20 ft. thick are left between room faces and the 1,600-ft. panels are sealed with the pillars left standing.

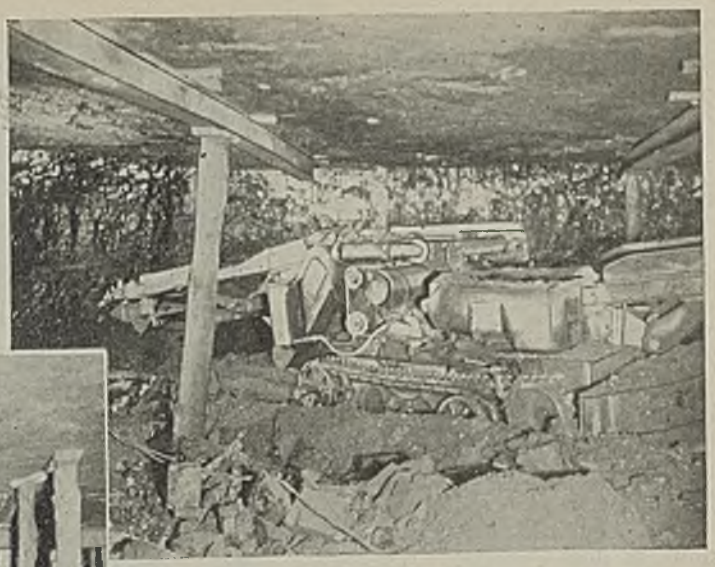
FOR the most part only two H-beams are used per face. In ordinary or fair top the rear beam is moved to within 3 ft. of the face after the loading of a cut is completed. Four wood posts are set under the beam, which is not moved during the cutting, shooting or loading. In the worst places the forward beam is placed as close as within 18 in. of the cleaned-up face.

Beginning recently the 9-ft. cutter bars of the shortwall machines are being shortened to 7½ ft. With this latter cutter bar the beams are about 7 ft. apart when two are used. For each cut one beam has to be moved, except when three beams are used per face, in which case two are moved per cut.

Making up the cost of this steel-beam protection, labor is the greatest item. The method requires two timbermen per loading machine instead of one. Although the beams cost approximately $15 each, the fixed charges have not been large because comparatively few have been lost by reason of heavy falls. No accurate check of the number has been kept, but Willington O'Connor, general superintendent, says that it does not total over twenty in the 4½ to 5 years of use.

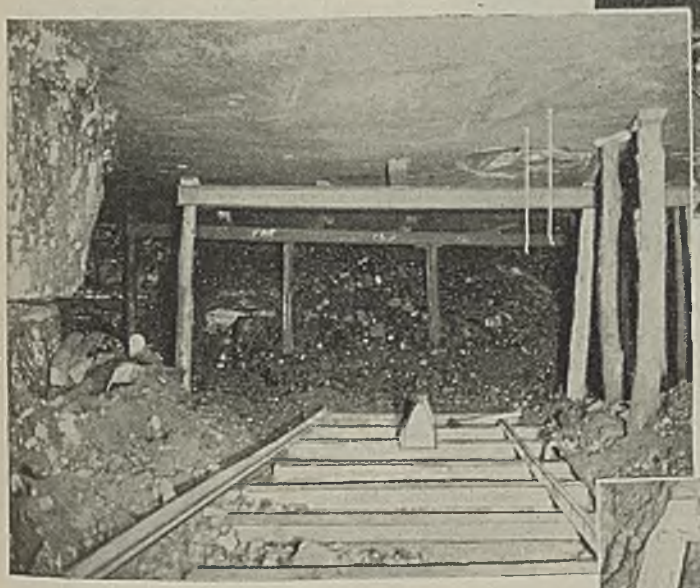
THE beams are raised into place by the two timbermen without the aid of jacks, but often they are aided by other men who may be working near by. As the cutting, and later the loading, is done, one post at a time is removed temporarily or moved to a new location under the beam by the machine crews to make room for the operation. As the steel beams are advanced with the face, four rows of props are set behind them in the ordinary way.

At all times one loading machine has been kept in reserve for substitution in case another is undergoing repairs. A rather temporary shop,

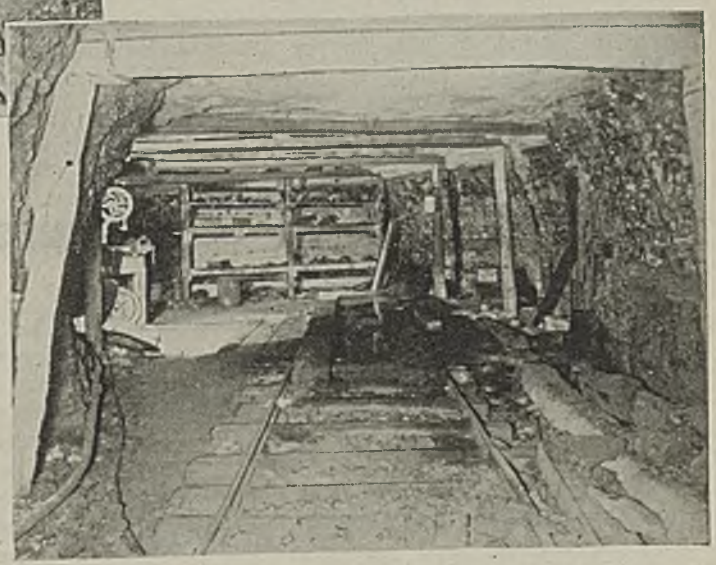


Post Removed from End of Front H-Beam, Allowing Loader to Clean Up the Corner

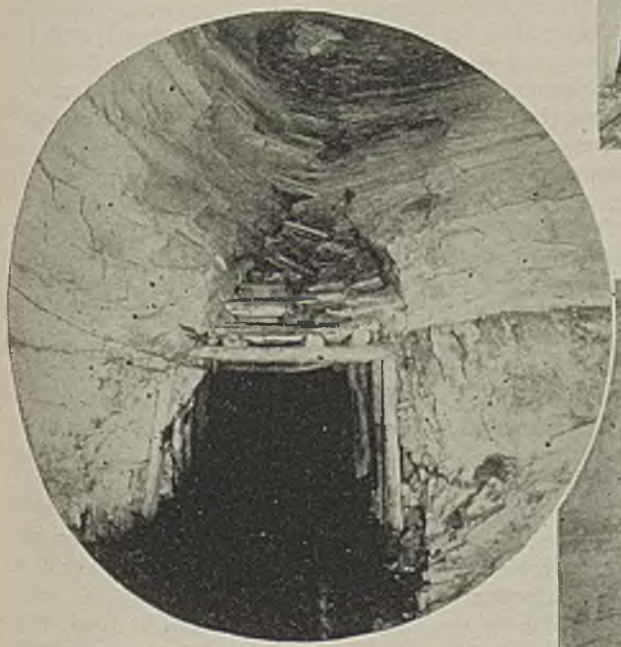
Two H-Beams in a Room Just Being Widened; at Left Is a Breakthrough



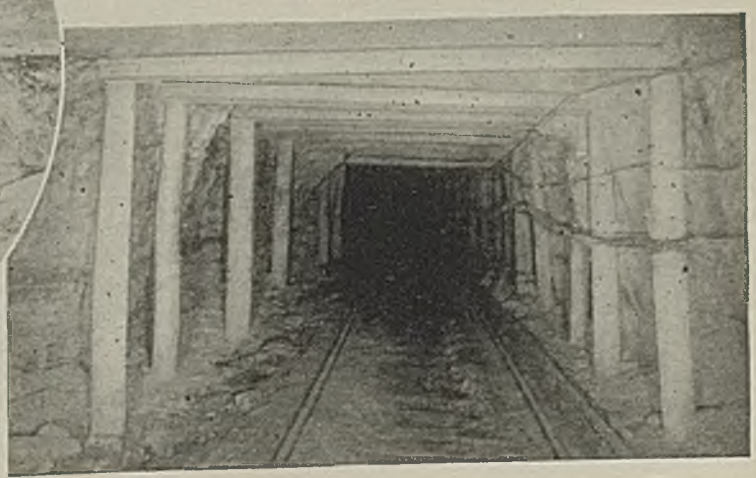
Section Repair Shop; the Substation Equipment Is in a Connecting Room at the Left



Showing How the Sandy Shale Top Keeps Coming; Here About 9 Ft. Has Come Down



Creosoted Pine Posts Moved from Where They Were Installed Six Years Ago



but one equipped with repair pit, is located near the center of each loading-machine territory. The shop location together with that of a substation in connection is advanced whenever the farthest loading machines get approximately 2,000 ft. away from it.

Direct current is used on the loading machines and alternating current on the mining machines. A typical substation contains one 150-kw. synchronous converter with its transformers, also three 25-kva. transformers for supplying the undercutters.

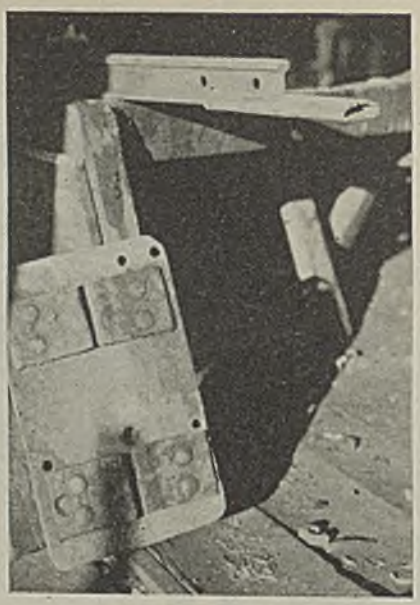
Five Joy loading units work during the day and three at night. Of the five units, two cut and load narrow work. One of these entry-driving units is double-shifted. The other Joy machines advance their own narrow work after being started in a territory.

FACE preparation before shooting the main body of coal consists of shooting light pop shots and pulling this portion of the coal out in front of the face by hand methods. Cutting out the parting and shearing the face with a combination machine was tried but was found too costly. Part of this difficulty was because of the division of work required by the union labor contract when the manual labor was reduced to the point that there was not steady work for all of the men.

Each loading machine carries two, or as many as four "loader splicers" for connecting the short extension rails to the ends of the room tracks, which are laid with 16-lb. steel. These splicers, which are shown in one of the photographs, are the invention of Lloyd Price, mine blacksmith. They are made by splitting a piece of double-strength 2-in. pipe, then flattening it so that it will slide over the base of the rail section. This device is very much lighter and is otherwise more satisfactory than the superseded and cumbersome plate type shown at the bottom left in the same photograph.

When the mine was on hand loading the cars carried an average of 4,500 lb. With machine loading the capacity dropped to 3,600 lb., including the extra refuse hauled out of the mine and removed at the tipple.

Mention was previously made of sealing the worked-out panels. The place for each seal is definitely located by the mining engineer and the entry is narrowed down from the usual 10 ft. width to 7 or 8 ft. at this point. Besides the saving in cost of constructing the seals, this method has the advantage of being equivalent to making a tighter and stronger wall. These seals are built 4 ft. thick; made up of a 4-in. brick wall on the inside, an 8-in. brick wall on the outside and the center space filled with rock and concrete. Stoppings along the main entries are 3-ft. rock walls.



Splicers of the Old Plate Type and of the New Tube Type

Creosoting of timber has proved its value at this mine. When the shaft was sunk in 1918 creosoted oak posts were put under the steel beams that were installed to protect the main bottom. As yet these posts show no signs of decay. About six years ago a start was made in the use of creosoted pine posts for supporting the steel crossbars on the mains. This timber was treated at a plant in Terre Haute, which is about 35 miles distant. One of the accompanying photographs shows a few of these original 6- to 8-in. posts that were moved to the present location after three years of service at another place. The six years in the mine have not caused the posts to show any signs of decay.

Taken as a whole the methods at No. 28 mine show commendable progressiveness considering the obstacles that have been met at almost every turn. The mine has been kept working a large part of that time during which the active underground mines of the state could be counted on one's fingers.

Mechanization's Greatest Need

(*Continued from page 405*)

The pillars are mined by driving places at right angles to the rooms, or "butt-on" at the end of the pillars. Hand methods are employed.

This system has been in use for over eighteen months and has given results exceeding expectations. Improvement in all phases of the mining operation has been experienced since the change in the mine layout. Of most benefit have been the regularity with which breaks occur in the wake of the retreating pillar line and the periodic relief from accumulating pressure which results. As exerted the pressure facilitates easy winning of the coal.

A system of this sort, perhaps on a smaller scale, would favor mechanization in many ways. Most notably it would provide a high degree of concentration. All room faces or pillar ends at any time being equidistant from the entry, uniformity in the daily output would be procured to a degree never attainable where places are stepped. A better quality of coal from the standpoint of size would be produced. The coal would be more easily won. Safer roof conditions would prevail and machinery could be put to more economical use. The writer has been advocating trials of this system for several years.

A paradox in mechanical mining is that two schools of endeavor are with rare exceptions developing in diametrically opposite directions. The loading machine is eliminating arduous labor but it is not surmounting the transportation problem. The conveyor is overcoming transportation difficulties and, it must be granted, is lightening the burden of labor; but it is not wholly eliminating the shovel. That system which will accommodate the operation of these two machines in combination is destined to grow in favor. That system most probably will be characterized by a longface attack either by cuts across the end of the pillar or by slabbing the ribs. Wherever possible, a system of this sort should be adopted as it gives promise of greater eventual success than more confined layouts.

PIPE *Lowered Into Borehole On Bed of Sand*

By Ivan A. Given
Editorial Staff, Coal Age

PIPE for silting purposes must be hard and resistant to abrasion or it will have to be replaced frequently. At the Prospect colliery of the Lehigh Valley Coal Co., Wilkes-Barre, Pa., it was decided in 1927 that a hard white-iron pipe of high silica content should be used to line a 16-in. hole sunk through the Baltimore and Skidmore beds to the Red Ash, in which bed were areas to be filled with silt.

An effort was made to lower the entire pipe from the surface by inserting a plug, or hoisting button, on which the bottom end of the pipe would rest, lengths of pipe being added as the pipe was lowered. A rope was coned and attached to the button with an eyebolt.

The rope thus secured passed up through the pipe and over a sheave at the surface. After the pipe had been lowered a length, clamps were put on the rope to hold it in place above the hole, the rope was lifted off the sheave, passed through another length of pipe and through a loose sleeve and again put over the sheave.

The rope, after being fastened to the lowering hoist, was unclamped and the new pipe length was placed over the top length in the hole, the sleeve to connect the two being brought over the joint and held in place by asphaltum applied hot.

The strain was considerable, as the pipe walls were 1 in. thick, the interior diameter 8 in. and the outer diameter 10 in. Each section was 10 ft. long and weighed 1,000 lb. From the surface to the Baltimore bed there were 50 lengths and between the Baltimore and the Red Ash beds there were to be about 36 lengths. The total weight without sleeves would have been 85,785 lb., or about 43 tons. Approximately 35 tons had been lowered by rope when the latter pulled loose from its socket, letting the pipe fall down the hole, but at a point several feet above the Red Ash bed it jammed and went no further.

The drillers who had undertaken to place the pipe tried in vain to free it by fishing tools, but it was too tightly wedged. These methods failing they tried to drive the pipe down from above, but in this also they

Borehole for Reception of Silting Pipe

failed. Finally they attempted to cut the pipe with a shot drill, but found it too hard. Two months passed and they were still vainly endeavoring to find some solution of the difficulty.

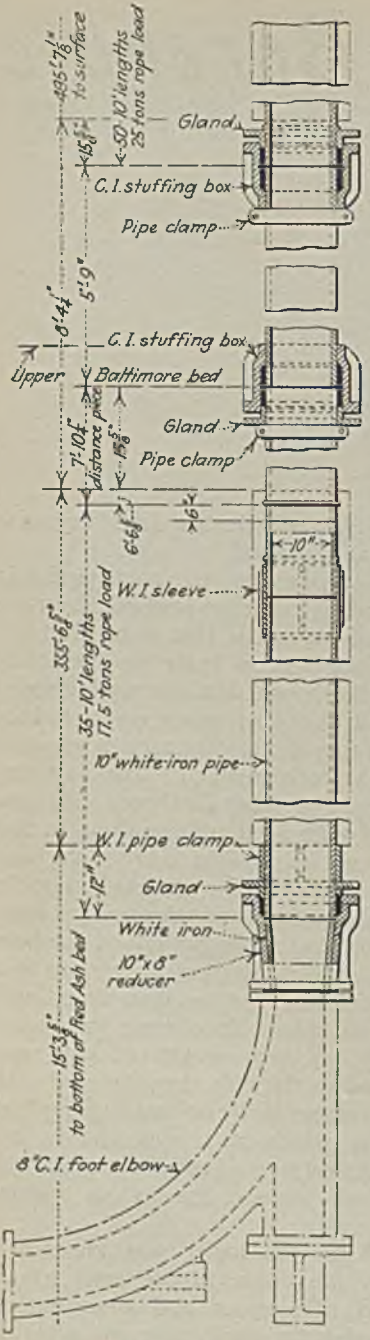
Paul Sterling, mechanical engineer of the Lehigh Valley Coal Co., seeing that no progress had been made and recognizing that the pipe which presented so much resistance to cutting tools would yield quite readily to a fracturing shock, decided to break the pipe by explosives. A seven-cartridge charge was raised from the bottom of the borehole on a stick and thrust into the pipe and fired. The pipe was shattered in this manner and the broken pieces fell out into the Red Ash bed. In two days the entire hole was cleaned.

After cleaning the hole, pipe was placed by the rope method from the Baltimore to the Red Ash. But for the long section from the surface to the Baltimore, Mr. Sterling decided to let the pipe down on a bed of sand in order to eliminate the dangers of the rope method. The hole was plugged at the Baltimore bed and filled with sand. Some thought that it would be possible to lower the sand bed and the pipe resting on it by bleeding the sand through a valve in the plug at the bottom of the hole, but, as Mr. Sterling knew, this was not feasible, for the sand would arch in the hole. To obviate this possiiblity, as each length of pipe was placed in the hole the displaced sand was removed by a "sand pump" or bailer, which, as is well known, is a light steel pipe of small diameter with a clack valve at the bottom opening upward.

When the bailer was lowered in the pipe down to the level of the sand, the water and sand entered through the clack valve and filled the bailer. On the bailer being raised the clack valve closed in response to the greater pressure on its upper side. Thus the sand and water were bailed out of the hole.

Sometimes it was necessary to bail down 8 or 10 ft. before the silting pipe would budge, but usually it would travel down an inch at a time as the sand was removed. As the sinking operations were conducted for only eight hours in 24, the sand around the pipe tended to pack hard during the period of idleness. Accordingly the skin friction sometimes was sufficient to hold up the pipe against the weight of 10 or 15 tons of silting pipe, even when the sand below it was removed.

When the packed sand could not



Pipe Installed in Borehole Showing Curve at Red Ash Bed and Coupling at Baltimore Bed

be removed by bailing, a churn drill was used to lower it, or when the sand outside the pipe held it by skin friction, a water jet was used to free the pipe. When the pipe did settle for any great distance it did it so forcibly that there was some fear that the pipe might be broken. To avoid the possibility of this breakage a cushion layer of asphaltum with rubber gasket was placed between the pipes at the joints. Thus the shock of the entire weight of pipe was cushioned, which was helpful not only to the upper pipes but to the lower length also.

One night the pipe went down unexpectedly and the top disappeared to a depth 5 ft. below the surface. Fortunately it was found possible to bell out the sleeve and fit it over the top of the joint in the borehole. The asphaltum was poured through a 1-in. pipe to make the joint. The operations were then resumed, but thereafter precautions were taken to leave about 10 ft. of pipe above the surface over night in case the sand should slip and let the pipe down.

On reaching the Baltimore bed, screw jacks were used to lower the pipe to proper elevation. The pipe was cemented in the hole and connection made to the lower length between the Baltimore and Red Ash beds by means of slip sleeves with stuffing boxes.

Should Hoist in Intake Air, Says Mine Safety Board

AS A BASIS for recommendation and for instruction of bureau engineers the considered opinion of the U. S. Bureau of Mines is expressed in "decisions" of its Mine Safety Board, approved by the Director. Decision No. 11, approved by Scott Turner, Director, on Feb. 28, 1929, is as follows:

> "In the interest of safety, the Bureau of Mines, Department of Commerce, recommends that in coal mines, haulage and (or) hoisting be kept in intake air as far as possible."

As in the case of previous mine-safety decisions, the subject matter covered by this decision has frequently come to the attention of the Bureau of Mines through the reports of its mining engineers on explosion disasters and in accident-hazard investigations.

"Although expressed in a few words," says the Bureau of Mines in Information Circular 6139, "this decision is a matter of the greatest importance in the safe operation of mines, especially with the increasing use of electricity in mines. It has been frequently pointed out that since the very general use of permissible miners' lamps and permissible explosives in coal mines, the chief cause of explosions during the last few years has been electrical, and a number of these have been caused on haulage entries.

"Twenty-five years ago it was comparatively rare in the generally shallow workings of that period to find a truly gassy mine, but with the increase in depth of coal mining, especially in naturally gassy fields, the number and proportion of gassy and slightly gassy mines have greatly increased.

"In gassy mines it is vitally important to have the haulage and hoisting done in intake air because no one can tell when a dangerous gassy condition may arise which may lead to ignition on the haulageways if in return air, especially where trolley-locomotive haulage is in use. In non-gassy mines in general it is essentially immaterial as concerns hazards of explosion ignition whether or not the haulage and hoisting are done in return air. However, as fires may occur in any mine, and in practically any portion of any mine, it is safer even in non-gassy mines to have the haulage and hoisting on the intake.

"Where the main haulage is on the return and a fire occurs in practically any part of the mine, the smoke and fumes from the fire quickly fill the main haulage entries, and travel of men, man trips, or man-carrying cages is made dangerous and sometimes impossible.

"In many shaft mines at the time of fire, men have lost their lives or have been in imminent danger of doing so by trying to force their way through smoke and gas toward the upcast or return shaft in which they were accustomed to being hoisted; moreover, it may be the only shaft properly equipped with hoisting facilities.

"It is assumed that the haulage will in all cases be done in thoroughly rock-dusted entries, as haulage by trolley or other non-permissible locomotives is highly dangerous from the standpoint of coal-dust ignition unless the haulageways are kept thoroughly rock-dusted."

The members of the Mine Safety Board are: G. S. Rice, chief mining engineer, chairman; O. P. Hood, chief engineer, mechanical division; R. R. Sayers, chief surgeon; D. Harrington, chief engineer, safety division; and C. W. Wright, chief engineer, mining division.

Stockroom and Requisition

Control System

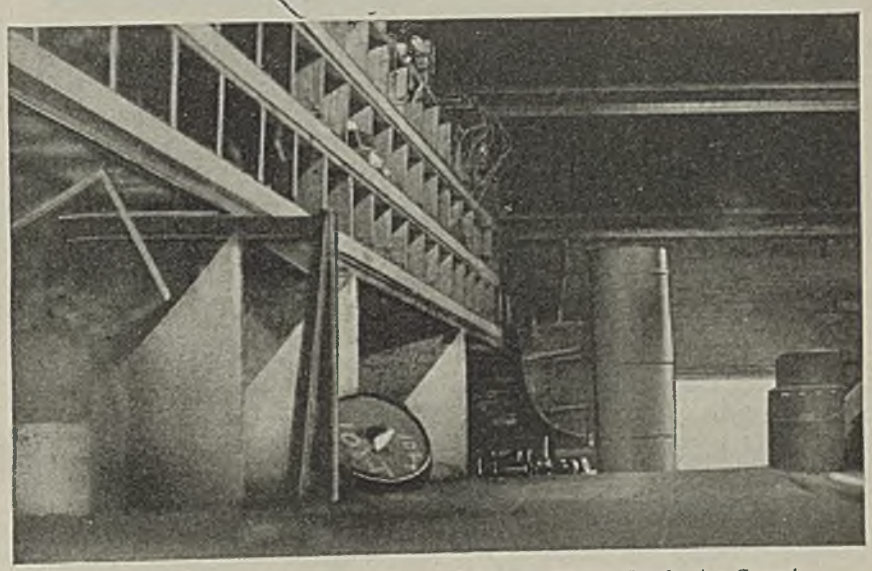
Cuts Inventory

And Upkeep Cost

Form 1, Bin Tag

By James H. Hugg

Purchasing Agent
Madeira-Hill Coal Mining Co.



Portion of Stockroom Showing Rows of Bins in Which Goods Are Stored, Identified by Bin Tag (Form 1)

ONE of the major items entering into the cost of producing coal is that of supplies. The proper control and accounting of this particular item, therefore, is highly desirable to the management of coal-mining operations. Where two or more mines are located within a reasonable hauling distance of each other, so as to permit an economical distribution of supplies from a central storehouse, the question of control does not present a difficult problem, but where two or more mines are widely separated, the distance between them being so great that trucking would be an uneconomical proposition, the question of stock control becomes more difficult. To meet this latter situation the following system was devised.

At each operation the mine clerk or an employee experienced in the handling of supplies is held responsible for receiving and distributing all materials and making the necessary records of all transactions of this nature. This employee, hereinafter referred to as the mine clerk, is accountable to the chief stock clerk, who is located in the district operating office. The time required by the mine clerk to perform this work is from one to two hours daily, including the clerical part of it; the remainder of his time is expended in other channels, depending upon his regular occupation. Thus the personnel needed for carrying out the provisions of the system is composed of part-time mine clerks and one full-time chief stock clerk, all under the supervision of the purchasing department. In the accounting of materials, eight forms are used, an illustration of each one being shown in this article.

At operations where several small buildings are used for storing supplies, and in cases where it is feasible to do so, these buildings should be torn down and converted into one large storehouse. With shelves and bins installed and the stock arranged in a neat and orderly manner and having materials on the outside properly arranged, the chief stock clerk and mine clerk then proceed to take a physical inventory of every item. The bin tag, Form 1, is used on each shelf or bin and is tied with wire to bulky materials. This bin tag, size $2\frac{3}{8}$x$4\frac{7}{8}$ in., has space for the name of the article, description, and part number. It also contains space for marking the date, quantity of material received and removed, and the balance on hand.

Having marked the date of inventory and balance on hand on all tags where they can be used and having completed the entire physical inventory, the chief stock clerk enters each item in one of two 11x17 in. forms (Forms 2 and 3) which are made up into a loose-leaf "Stock Record Ledger." Form 2 is used for items that are distributed practically daily, thereby requiring a great deal of space for posting the nu-

merous transactions. Form 3 is used to cover from two to eight items that are not distributed often, especially repair parts, which compose at least 50 per cent of the number of parts in the inventory.

In the upper right-hand corners of Forms 2 and 3 are shown the name of the article, complete description and unit, and, under the caption "balance," the date of inventory, quantity on hand as of that date, unit price, and total value. Separate ledgers are required for each mining operation. These ledgers having been brought up to date, as far as physical inventories are concerned, the method of distribution and the forms used in conjunction therewith will now be described.

On all supplies distributed, except those sold or transferred to other mines, Form 4, "Supplies Issued," is used by the mine clerk. It is made up in book form, size 4½x8½ in., and is perforated along the left-hand margin. It will be noted that it contains space for the name of the mine, date, quantity issued, quantity returned, and quantity used, description of articles, and the account number to which chargeable on the cost statement. The employee receiving articles from the mine clerk is required to sign his name on the line provided, the quantity issued being shown in the "quantity issued" column. All materials received during the day which are not used are returned to the mine clerk by the employee receiving them. The quantity returned is marked in the second column from the left and the quantity actually used is shown in the "used" column. The proper account numbers are inserted.

At the end of each day the mine clerk transfers the information from the "Supplies Issued" reports to the "Daily Material Report," Form 5. This latter sheet is made up in duplicate in book form, size 7½x12⅞ in., the original being perforated and the

James H. Hugg

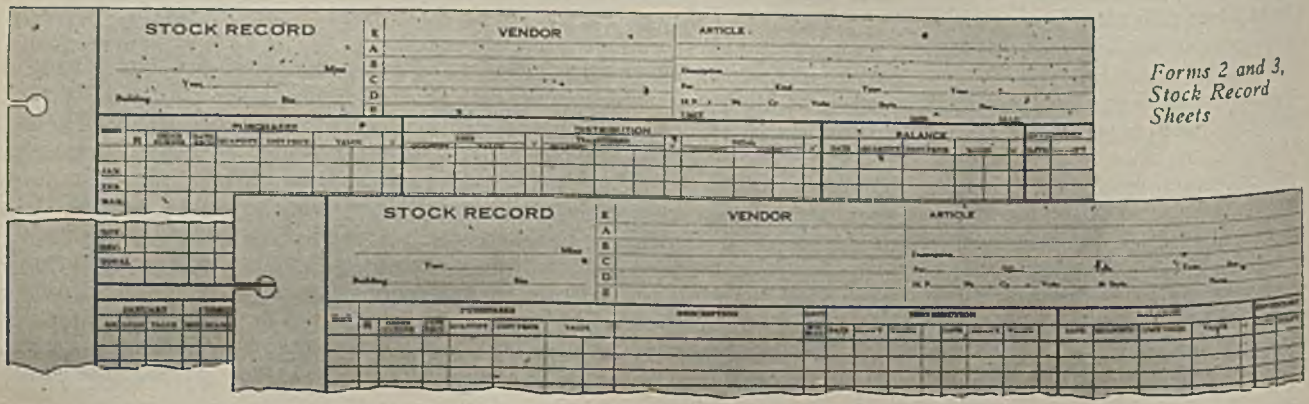
duplicate solid. Space is provided for the name of the mine, date, quantity issued, description of articles, part number, purpose for which used, the initials of employees distributing and receiving, the supply house number from which the article was taken, the account number, unit cost and amount. Under the caption "unit cost and amount," the spaces are left vacant and after the report is signed by the mine clerk and foreman or superintendent the original is forwarded to the chief stock clerk and the duplicate is retained at the mine.

Upon receipt of this report by the chief stock clerk, he refers to the "Stock Record Ledger," Form 2 or 3, as the case may be, and inserts on the report the unit costs and amounts, and in the same operation marks on the ledger sheets each item used under the caption "distribution," showing the date, quantity and value. The correct balance, unit price and amount are then brough down under the "balance" column. The chief stock clerk, having completed the report, releases it to the cost accountant for use in charging the amounts shown opposite in various accounts under the proper classifications on the cost statement.

As noted in a preceding paragraph, supplies sold at the mine are not marked on the "Supplies Issued Report," Form 4. A separate form, No. 6, "Daily Supplies Sold Report," is used for these transactions. It is made up with original and duplicate sheets in pad form, size 8½x11 in., with the names of the articles that are used most printed at the top of the form. Space is provided for the name of the mine, date, check number of employee and the quantity of each article issued. There also are blank spaces for use in writing the names of additional articles.

The mine clerk is given the sales price of the different items and when the daily sales are made he inserts the total value of sales to each employee in the "total" column shown on the right-hand side of the form. The total quantity of each article sold is shown at the bottom of the report opposite the caption "total material." The mine clerk retains the duplicate copy and forwards the original to the chief stock clerk, who enters the total quantity of each item sold in the "Stock Record Ledger," Form 2, under the heading "daily distribution." The cost price of the articles is used in making entries in the ledger covering these transactions. The "Daily Supplies Sold Report" is then turned over to the payroll clerk for use in making charges against the employees.

When supplies are transferred from one mine to another, the "Material Transfer Report," Form 7, is used by the mine clerk. Form 7 is made up in pad form, size 7½x8⅜ in., having an original, duplicate, and triplicate copy. Space is provided for the name of the mine, date, the mine from which shipment is made, description of articles, unit price and amount. The lower part of the form



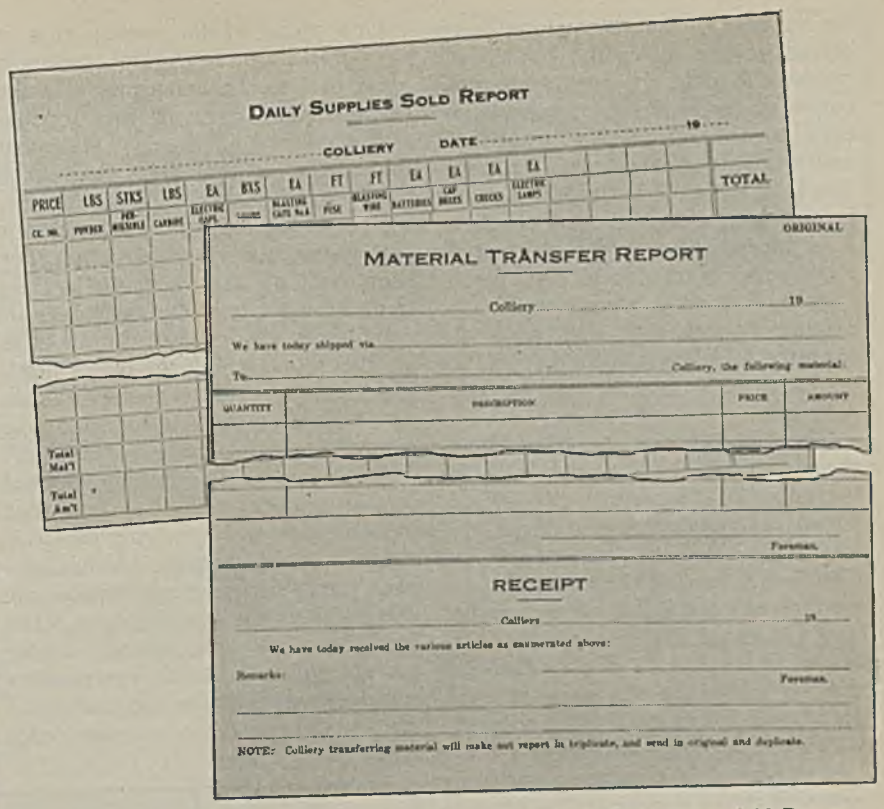
Forms 2 and 3, Stock Record Sheets

contains space for marking the receipt of material. The mine clerk transferring material retains the triplicate and forwards the original and duplicate to the chief stock clerk. The unit price and amount is then inserted from the "Stock Record Ledger" and both copies forwarded to the mine receiving the material. Upon receipt of the articles, the mine clerk marks in the date received and, after signing both copies, the duplicate is retained and the original forwarded to the chief stock clerk. An invoice is then made covering the transfer, the mine making the transfer receiving credit in the "Stock Record Ledger" under the heading "distribution" and the mine receiving being charged in the ledger under the heading "purchases."

The methods employed and the distribution of supplies having been shown, an explanation will be here given of the "Requisition" and its function in keeping the inventories to a minimum. This form, size 8½x11 in., is made up in pads containing original and duplicate copies. The heading is properly filled in, the quantity of each item on hand is shown, the quantity required, together with a complete description of the articles. It is then signed by the foreman and certified correct by the mine clerk and the original forwarded to the chief stock clerk. The "Stock Record Ledger" is then referred to by the chief stock clerk, who marks on the "Requisition" the average monthly consumption, quantity on hand, and quantity due. Information as to the minimum and maximum of each item to be carried on hand is shown by the chief stock clerk on the "Requisition" form. The minimum and maximum figures were arrived at only after a year's trial of the system in order to determine as accurately as possible what those figures should be.

When a mine is to be closed down for an indefinite period, any supplies on hand at that particular operation are transferred to other operating mines when requisitioned by them. The chief stock clerk shows this information on all "Requisitions" in cases of this kind. The "Requisition" is then passed on to the various operating officials for their approval. The purchasing agent then receives it and the inquiries are sent out, quotations received, and materials are ordered.

The purchase order is made with an original and three copies, the original being forwarded to the vender, the duplicate retained by the purchasing department, and the third and fourth copies are sent to the mine clerk. The chief stock clerk uses the purchasing department's copy of the order to insert in the "Stock Record Ledger" the order number, quantity of each item ordered, and the name of


DAILY SUPPLIES SOLD REPORT

COLLIERY ..... DATE ..... 19....

PRICE | LBS | STKS | LBS | EA | BXS | EA | FT | FT | EA | EA | EA | EA | TOTAL

CC. NO. | POWDER | PER-MISSIBLE | CARBONS | ELECTRIC CAPS | CAPS | BLASTING CAPS No. 8 | FUSE | BLASTING WIRE | BATTERIES | CAP MULES | CHECKS | ELECTRIC LAMPS

Total Mat'l

Total Am't

ORIGINAL

MATERIAL TRANSFER REPORT

Colliery ..... 19....

We have today shipped via .....

To ..... Colliery, the following material:

QUANTITY | DESCRIPTION | PRICE | AMOUNT

Foreman.

RECEIPT

Colliery ..... 19....

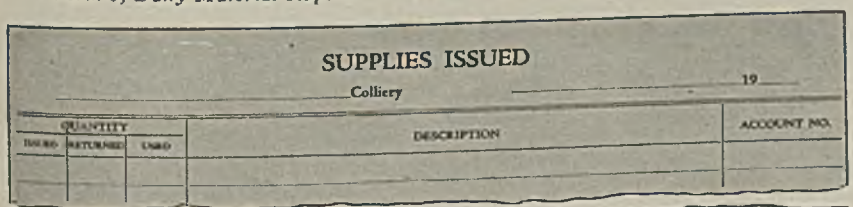
We have today received the various articles as enumerated above:

Remarks: ..... Foreman.

NOTE: Colliery transferring material will make out report in triplicate, and send in original and duplicate.

Form 6, Daily Supplies Sold Report
Form 7, Material Transfer Report

Form 4, Supplies Issued
Form 5, Daily Material Report


SUPPLIES ISSUED

Colliery ..... 19....

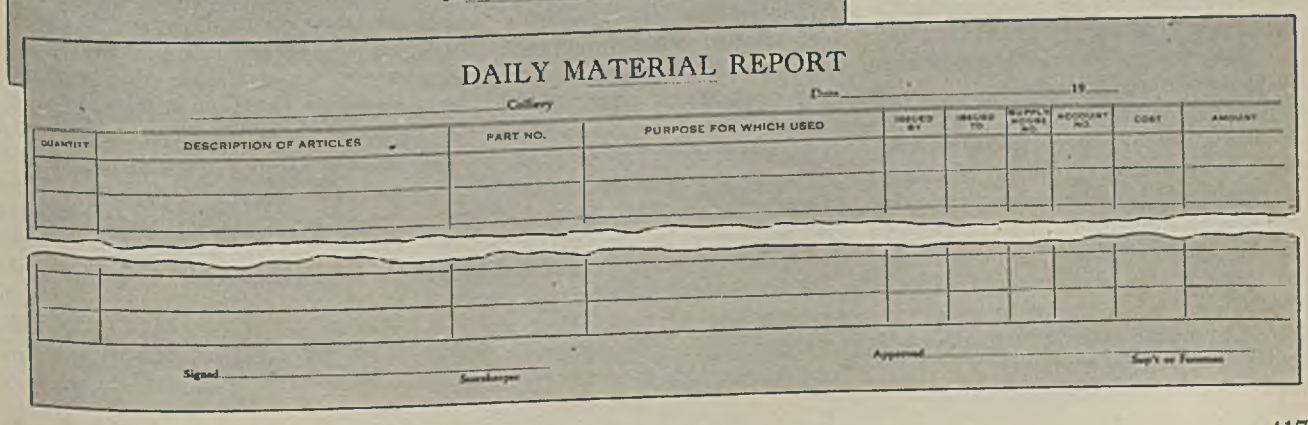
QUANTITY: ISSUED | RETURNED | USED

DESCRIPTION

ACCOUNT NO.

RECEIVED THE ABOVE ARTICLES

Signed .....


DAILY MATERIAL REPORT

Colliery ..... Date ..... 19....

QUANTITY | DESCRIPTION OF ARTICLES | PART NO. | PURPOSE FOR WHICH USED | ISSUED BY | ISSUED TO | SUPPLY ACCOUNT No. | ACCOUNT NO. | COST | AMOUNT

Signed ..... Storekeeper

Approved ..... Sup't or Foreman

the vender. When the material is received at the mine, the mine clerk marks the date of receipt on both copies of the order and forwards one copy to the purchasing department and retains the other copy for filing. The date of receipt is marked on the invoice and, after the usual checking, it is turned over to the chief stock clerk, who enters each item in the "Stock Record Ledger" under the caption "purchases" and adds the quantity and amount to the balance on hand as shown in the "balance" column.

The monthly cost statement shows the value of the inventory at the beginning of the month, to which is added all purchases, and from this total is deducted the value of supplies distributed, leaving the amount of inventory as of the last of the month. The values of the items on hand as shown in the "Stock Record Ledger" can be added at the end of each month, and this total should agree with the inventory as shown on the cost statement. Credit memorandums covering material returned to venders are shown as credits in the ledger on the sheets to which they belong under the caption "distribution."

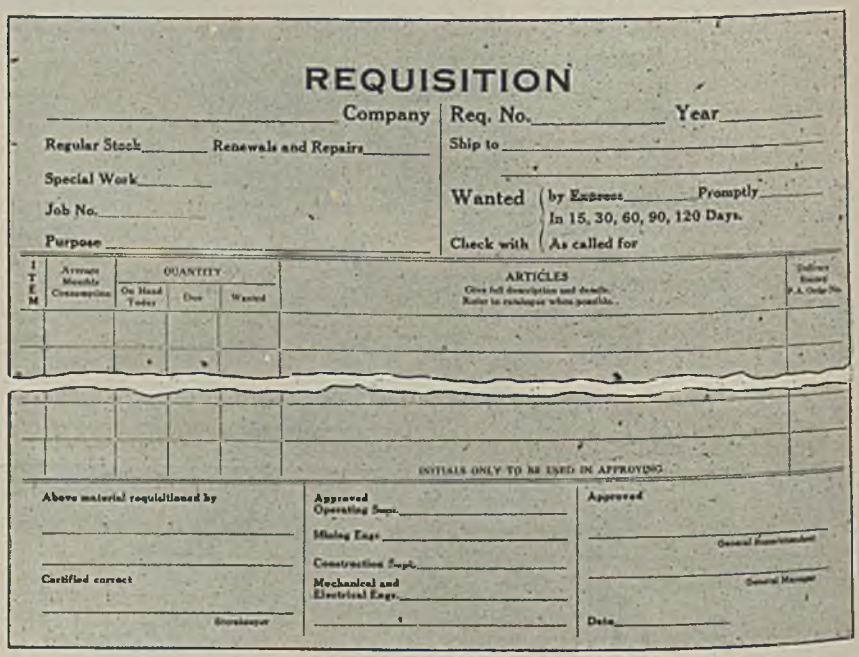
The time required by the chief stock clerk in making all entries in the "Stock Record Ledger" depends upon the number of mines reporting. Experience has shown that several mines can be easily taken care of on an average of four hours daily. The remaining time is spent in checking physical inventories at the mines and making any necessary reports required by the management. As the stock ledgers are balanced at all times, the inventory records are perpetual and a check-up on the physical inventory can be made at certain periods whenever deemed advisable. However, a definite schedule of checking inventories every three months is considered to be most practical. The "Stock Record Ledger" can be taken by the chief stock clerk to the operation and the actual quantity of each item on hand can be shown under the heading "inventory."

It has been shown with this system that the physical inventory in nearly every case is lower than the ledger inventory, but the discrepancies average only about 2 per cent of the total book inventory. This shortage is due mostly to failure of the mine clerk to make the necessary records when rushed for supplies during breakdown periods or when the night watchman fails to mark down emergency supplies required by pumpers.

One phase of the system that is very important and which means a great deal to the management is the matter of having the charges for materials entered on the cost statement under the classifications to which they properly belong. This, of course, applies to the companies having their cost statements so arranged that they show not only the various classifications of labor but also the materials used under those classifications. As an illustration, under the major heading "drainage" there are several accounts, one of them being "pumping equipment, maintenance and repairs." This account or classification bears a certain number. All labor performed in connection with repairing pumps is charged to this account and all supplies used in repairing pumps are chargeable to the same account. The production cost being based on the per-ton unit, and with comparative costs per ton both for the month and for the year shown opposite each classification, any unusual deviation is readily noticed. Where it is found necessary to obtain an itemized list containing the supplies used and costs entering into any account this information is available from the "Daily Materials Report," Form 5.

The data contained in the "Stock Record Ledger," the main control, are invaluable to the purchasing department. This ledger eliminates the necessity of maintaining two separate records, one for stock and one for purchases. As all purchases are entered in the ledger under the caption "purchases," with the order number and the firm from whom the material is purchased also shown, it is an easy matter to refer to the order for any required additional information.

Where it is found that an unusual quantity of a certain item is being used, the cause is investigated to determine whether the use is justified. In cases where insurance is carried on contents of buildings, an itemized list of materials can be obtained from the "Stock Record Ledger" in claim adjustments resulting from fire losses. In making contracts and annual reports it is necessary to know the consumption of different articles and this information always is available when needed. A record can be made from the ledger showing the quantity of each item used per thousand tons of coal produced. Knowing the approximate tonnage to be mined from each operation for a reasonable period, the purchasing agent is in position to take advantage of the market.



REQUISITION

Company | Req. No. | Year

Regular Stock | Renewals and Repairs

Special Work

Job No.

Purpose

Ship to

Wanted (by Express | Promptly | In 15, 30, 60, 90, 120 Days.)

Check with (As called for)

ITEM | Account Number | Average Monthly Consumption | QUANTITY: On Hand Today | Due | Wanted | ARTICLES: Give full description and details. Refer to catalogue when possible. | Delivery Record

INITIALS ONLY TO BE USED IN APPROVING

Above material requisitioned by

Certified correct

Foreman

Approved
Operating Supt.
Mining Engr.
Construction Supt.
Mechanical and Electrical Engr.

Approved
General Superintendent
General Manager

Date

Form 8, Requisition Blank

This stock system has been in use for seven years and the advantages were not fully realized until after the first two years of trial. At the end of this period it was found that in producing the same tonnage the inventories had been reduced by nearly 50 per cent. The amount of capital so released and invested at 6 per cent amounts to several thousand dollars annually. As the cost of upkeep is very small in comparison with the the savings effected, it is well worth while, where conditions warrant it, to any operator considering the installation of a system designed for stock control.

Making the

BONUS

*A Real Labor Incentive**

By William Baum

Real Silk Hosiery Mills
Indianapolis, Ind.

PROCESSES *of production may differ radically but through all industry run common threads which mark fundamental problems. How to fix wages which shall be fair alike to employer and employee is one of these problems. In its solution the mill may learn from the mine and the mine may go to school at the factory. The method in one industry may not be adapted to the necessities of another but the underlying philosophy is worth studying.*

MODERN leaders of labor and industry who recognize that they have a common interest in the stimulation of production have done much to bring about industrial co-operation and good will in recent years. Internal conferences, works councils and recognition of the human factor have greatly broadened the interest of the employee in the operation of the plant and have brought him to see the importance of scientific management, modern wage-incentive plans, instruction and training, and planning and production control. Industrial peace rests on a new philosophy of management which firmly believes that high wages are not inconsistent with low labor costs.

To obtain the best results, operating conditions must be standardized to define responsibilities and eliminate waste, duplication of effort, false motion, unnecessary fatigue and delays. The establishment of standardized operating conditions is greatly facilitated by the proper use of time-study methods, which also provide a scientific basis for wage-incentive plans.

Time study upholds exact knowledge of facts and discards guesswork and superficial observation. Its objects are to discover the normal speed which a group can maintain without harm to health and happiness, disclose delays and uncover mechanical improvements which will reduce fatigue and muscular effort. Its success does not depend only upon the technique and skill with which it is administered but with equal force on the art of putting its psychology into practice. The worker should have his voice in the arrangement, as most labor disputes hinge on the wage question and can be reduced only if the basis for setting rates is indorsed by the one who does the work and the one for whom the work is done.

With the establishment of standardized operating conditions and time study, the stage is set for the introduction of wage plans. Either the worker is paid for the time he gives to the job or he receives a compensation which depends upon his output, quality and economy. If time work is paid and good and poor workers receive the same remuneration, this plan is unfair.

However, when a direct relation exists between effort and production, it is advantageous to measure this relation and pay the worker according to a predetermined plan. The term "production" implies not only so many units but also quality and waste of material. The problem of providing a suitable wage-incentive plan is far from simple, as the employer attempts to keep his costs as low as possible, whereas the workers strive for the highest attainable wages. These apparently conflicting desires are at the bottom of industrial unrest. The solution of the problem is possible only if the wage plan establishes the identity of interest between employer and employees.

A widely used compensation method is the straight piece-rate plan. A base rate is established for a certain operation and, upon completion of the time study, a piece rate is set which, in the opinion of the employer, will give the worker an earning power equal to the base rate. This system, although simple, is objectionable in that correct piece rates are difficult to establish, especially in new operations. Consequently, the employer, when earnings rise, is tempted to cut rates. Dissatisfaction results and the workers, to protect existing rates, defeat the plan by "soldiering."

A worker's earnings also are affected by breakdowns, defective material, etc., over which he has no control, and he often feels insecure. Unless minimum earnings or special allowances are established the plan may prove disappointing. As the piece-rate plan is conducive to quantity production at the expense of quality, employers must provide careful inspection and re-inspection. These facts show that the earnings of the operators should depend not only upon production but also upon the degree of perfection and waste.

Over 35 years ago, F. A. Halsey proposed an incentive plan in which unit labor costs are inversely proportional to production. Thus, if production increases, unit piece prices decrease. Apparently it is unfair to expect a high productive operator to work at a reduced rate. However, workers usually are unable to control operating conditions. If undesirable conditions exists, such as waiting, poor material, etc.. the management is penalized under the Halsey plan by being forced to pay higher rates.

While the piece-rate cost remains constant under varying conditions, the labor cost under the Halsey plan varies continuously and furnishes a yardstick for measuring increases in cost and disclosing inefficiencies. As production increases and costs are automatically reduced, the temptation to cut rates is entirely removed. The differences in the characteristics of the piece-rate and Halsey plans are brought out in Table I.

The characteristics of the Halsey

*Abstract of an address entitled "Labor Problems and Wage Incentive Plans," presented before the Columbus (Ohio) chapter of the National Association of Cost Accountants, May 27, 1929.

plan particularly adapt it to apprentices and learners. Their production is low and they require an allowance in excess of the piece-rate. As their production increases, the unit piece cost automatically decreases. However, as the workers become more experienced, the decreasing piece prices are a source of disappointment and discouragement. For this reason many employers have gone back to the piece-rate plan. But as the men grow older in service the piece rates remain the same. None of the known wage incentive plans take "length of service" into consideration and combine this factor with wage incentive based on productivity.

All these considerations have led to the design of a plan which takes the desirable features of the Halsey plan and combines them with rate increases which depend upon length of service. The worker then knows he will be recognized and hope fills his heart. As will be shown, the employer can well afford to make these periodic increases because of the savings resulting from a reduction of labor turnover and training expense.

Table I—Comparison of Earnings under Piece Rate and Halsey Plans

PIECE RATE SYSTEM

$0.05 per unit

Units	Earnings per Week	Earnings per Hour	Unit Labor Cost
400	20.00	.40	.05
450	22.50	.45	.05
500	25.00	.50	.05
550	27.50	.55	.05
600	30.00	.60	.05

HALSEY PLAN

Let the standard time to produce one unit be 6 minutes or 0.1 hour. The hourly rate is $0.50 and the operator works 50 hours per week

(a) Production: 400 units per week
Total standard time = 400x0.1 = 40 hours
Total actual time..... = 50 hours

Gross loss..... 10 hours
Net loss (50%)..... 5 hours
Payable hours = 50 − 5..... = 45 hours
Earnings = 45x0.50..... = $22.50

$$\text{Unit cost} = \frac{\$22.50}{400} = \$0.56$$

(b) Production: 500 units per week
Total standard time = 500x0.1 = 50 hours
Total actual time..... = 50 hours

Gain or loss..... 0 hours
Payable hours = 50
Earnings = 50x0.50 = $25.00

$$\text{Unit cost} = \frac{\$25.00}{500} = \$0.05$$

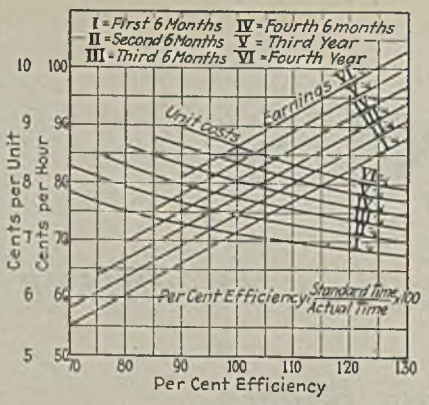
(c) Production: 600 units per week
Total standard time = 600x0.1 = 60 hours
Total actual time..... = 50 hours

Gross gain..... 10 hours
Net gain (50%)..... 5 hours
Payable hours = 50+5 = ... 55 hours
Earnings = 55x0.50 = $27.50

$$\text{Unit cost} = \frac{\$27.50}{600} = \$0.46$$

SUMMARY

Units per Week	Piece Rates—Earnings per Week	Piece Rates—Unit Cost	Halsey Plan—Earnings per Week	Halsey Plan—Unit Cost
400	20.00	.05	22.50	.056
500	25.00	.05	25.00	.05
600	30.00	.05	27.50	.046



Earnings and Unit Costs Under Service-Efficiency Plan

This plan makes use of the term efficiency, which is

$$\frac{\text{Standard time}}{\text{Actual time}} \times 100.$$

If the standard time units for a certain operation, as found by time study, are: style A, 0.250 hour per unit; Style B, 0.238 hour, and Style C, 0.227 hour, and a worker produces 60 units of Style A, 42 of Style B and 110 of Style C in a week, then the total standard time is 50 hours and the total actual time also is 50 hours. The efficiency therefore is 100 per cent.

For the sake of simplicity the new plan, covering a large variety of styles and patterns, is tabulated in Table II. A worker having reached an efficiency of 90 per cent extends his increases over a period of four years. For less efficient workers, the increases extend over shorter periods. The simplicity and flexibility of the plan permits universal application. If there is no variation in style, the productivity of the worker may be expressed in units per hour or week instead of "efficiency." If 100 per cent "efficiency" corresponds to a production of 500 units per 50-hour week, the unit cost relation is as shown in Table III. The earnings and unit costs are shown graphically in Fig. 1.

An operator working at 100 per cent "efficiency" is still considered inexperienced during the first six months. During the second six months, at the same efficiency, he earns 74.5c. per hour at the piece price of 7.45c. This, when he is earning what would be the piece rate, is considered the normal period. With each succeeding period the hourly earnings increase 3c. This is justified because of the reduction in labor turnover. With an average turnover of 100 per cent the length of service is one year. The average training cost is $250 per employee. If he stays three years over and above the normal period (total 4 years) he receives the increases, at 100 per cent efficiency, shown in Table IV. In Table V the training cost is compared with the increases.

It is not the purpose of the plan to show a saving. As long as the increases equal the training costs, these increases are fully justified, because of the intangible benefits accruing to both employer and employees.

With a loyal body of experienced workers, the concern enjoys greater production, better quality and lower unit production costs. The employees enjoy individual recognition of length of service.

Table II—Hourly Earnings, Efficiency Service Plan

Efficiency Per Cent	Earnings in Cents 1st 6 Mo.	2d 6 Mo.	3d 6 Mo.	4th 6 Mo.	3d Year	4th Year
70	55.0	58.0				
75	57.5	61.0	64.0			
80	60.5	63.5	66.5	69.5		
85	63.0	66.5	69.5	72.5	75.0	
90	66.0	69.0	72.0	75.0	78.0	81.0
95	69.0	72.0	75.0	78.0	81.0	84.0
100	71.5	74.5	77.5	80.5	83.5	86.5
105	74.0	77.5	80.5	83.5	86.0	89.0
110	77.0	80.0	83.0	86.0	89.0	92.0
115	79.5	83.0	86.0	89.0	91.5	94.5
120	82.5	85.5	88.5	91.5	94.5	97.5
125	85.0	88.5	91.5	94.0	97.0	100.0
130	88.0	91.0	94.0	97.0	100.0	103.0

Table III—Unit Costs, Efficiency-Service Plan

Efficiency per Cent	Units per 50 Hr. Wk.	Unit Cost in Cents 1st 6 Mo.	2d 6 Mo.	3d 6 Mo.	4th 6 Mo.	3d Year	4th Year
70	350	7.85	8.28	....	....	....	....
75	375	7.67	8.13	8.53	....	....	....
80	400	7.56	7.94	8.31	8.67	....	....
85	425	7.41	7.82	8.18	8.53	8.82	....
90	450	7.33	7.67	8.00	8.34	8.67	9.00
95	475	7.27	7.58	7.89	8.20	8.52	8.85
100	500	7.15	7.45	7.75	8.05	8.35	8.65
105	525	7.06	7.38	7.67	7.96	8.19	8.48
110	550	7.00	7.28	7.56	7.82	8.09	8.37
115	575	6.92	7.22	7.48	7.74	7.96	8.22
120	600	6.88	7.12	7.37	7.62	7.88	8.12
125	625	6.80	7.08	7.32	7.52	7.76	8.00
130	650	6.77	7.00	7.23	7.46	7.70	7.92

Table IV—Comparison of Increases with Length of Service

3rd 6 mo.
3c. per hour or $1.50 per week × 26 wks. = $39.00
4th 6 mo.
6c. per hour or $3.00 per week × 26 wks. = 78.00

3rd year
9c. per hour or $4.50 per week × 52 wks. = 234.00
4th year
12c. per hour or $6.00 per week × 52 wks. = 312.00

Total increase..... $663.00

Table V—Comparison of Increases with Training Costs

	Increase	Training Cost	Saving
2nd year.....	$117.00	$250.00	
3rd year.....	234.00	250.00	
4th year.....	312.00	250.00	
	$663.00	$750.00	$87.00

How Illinois and Indiana *Are Using* PIT-CAR LOADERS

THE SECOND OF A SERIES OF ARTICLES

By J. H. Edwards
Associate Editor, Coal Age

ILLINOIS continues to lead by a wide margin in the use of pit-car loaders although Indiana is loading perhaps as high a percentage of its underground tonnage with these machines. The majority of installations in other states might properly be classed as experimental because the non-union labor situation and thinner coal beds leave less margin of advantage.

Two Illinois mines of the Peabody Coal Co., both in the No. 6 seam, make extensive use of the heavy self-propelling type of pit-car loader. Twenty-four of these units are in use in the No. 17 mine, formerly Donk Bros. No. 4, at Edwardsville, and there are the same number in No. 3, at Marion. In the latter, which is 100 per cent conveyor, there are also in use six plain light-weight conveyors and one swivel type of medium weight.

Two men load onto each of the light-weight conveyors, which are used in driving 12-ft. entry. To the self-propelling units, which work in 26-ft. rooms, three men are assigned. The self-propelling conveyors are, of course, kept on the track all of the time, but on certain occasions the light-weight conveyors are rolled off onto the bottom.

In the No. 3 mine, which loads approximately 2,000 tons per day, the supervision now consists of a mine manager and three bosses instead of a mine manager and one boss, which was the practice with hand loading.

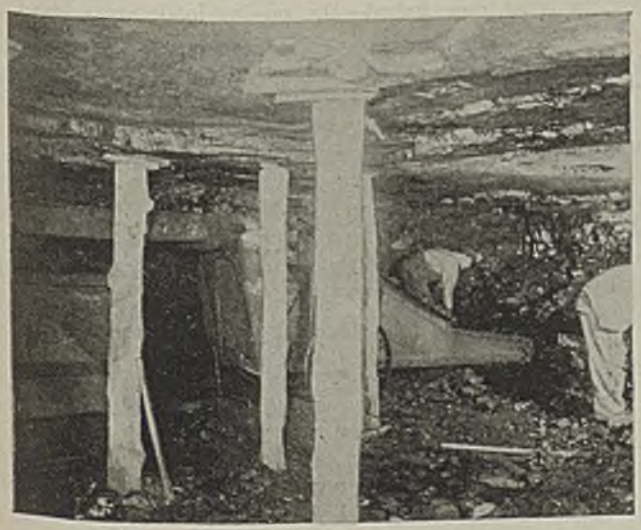
At Benton, Ill., the Franklin County Mining Co., which operates the Franklin mine, a 2,500-ton operation in the No. 6 seam, has gone extensively into the use of conveyors. Sixteen had been put into use by Feb. 1. This number consisted of four Jeffrey self-propelling, two General self-propelling, one General light-weight, five Fairfields, and four Manchas.

In the Franklin mine more men are used per conveyor than is the usual practice. A minimum of three are used on the small type and a maximum of five on the self-propelling units. According to J. M. Seymour, president of the company, the average is about four men per machine. Even conveyors of the lightest type are moved on the track from one working place to another, instead of being wheeled on the floor and through the crosscuts.

No. 14 mine of the Old Ben Coal Corporation, Buckner, Ill., was changed from hand loading to conveyor loading by an initial installation of 104 Duncan light-weight conveyor loaders. On hand loading the mine was producing 5,000 tons per day. After a few weeks of the 100-per cent conveyor operation it was producing 3,700 tons. At this mine the load per car dropped but little because the loaders were instructed to place one row of lumps around the tops of the cars.

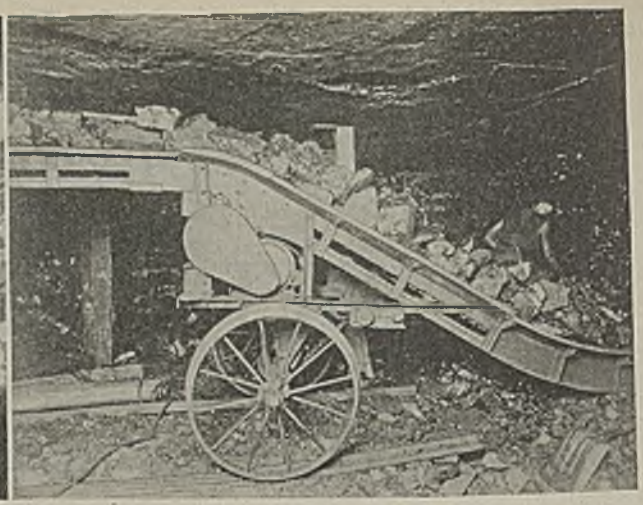
In mine No. 15 of the same company, at West Frankfort, 93 Duncan conveyors were installed. This is

Conveyor in 24-Ft. Room in Franco No. 2 Mine



Robbing a Pillar in Franco No. 2; Close-Set Props at Extreme Right in Rear Are a Breaker Row

Another View of Conveyor Robbing Pillars in Franco No. 2 Mine



Conveyor on Balled Rails in Franklin Mine

in a locality where the No. 6 seam runs up to 12 ft. in thickness as compared to about 9 ft. at Buckner.

It is the practice in these mines to drive the rooms 23 to 24 ft. wide with single track in the center. As a rule the conveyor loader is left on the balled slide rails provided for the cutting machines. At times, however, the conveyor is taken off the track and the mine car pushed onto the slide rails, bringing the car closer to the face.

THAT pit-car loaders are equally practical for pillar work has been demonstrated in mines of the Cosgrove-Meehan Coal Co. of Illinois. When on Feb. 1 the accompanying photographs were made in the Franco No. 2 mine, at Pittsburg, Ill., the operation was 100 per cent on conveyor loaders, with 26 in use. At that time, installation of the machines was taking place in the Franco No. 1 mine, at Johnson City, and in the No. 5 mine, at Panama. At all three of these mines the "Brownie" mine car loader of the Brown-Fayro Co., of Johnstown, Pa., was the only type being used.

The Cosgrove-Meehan company is said to be the only one in this district of the No. 6 seam which consistently takes pillars. In the No. 2 mine, in which the coal is 6½ to 7 ft. thick, the rooms are driven 24 ft. wide from a track carried close to one rib. Two loaders are assigned to each conveyor for both the advancing and robbing. Immediately after all of the rooms of a panel are driven up the pillars are robbed and the progress controlled so as to maintain two pillar lines meeting at an angle at the center of the panel.

The pillars, which are 36 ft. wide, are worked by "cutting through," instead of open-ending. No additional track is laid for the robbing. For the most part the conveyors are left on the track, but in places they are pulled off onto the floor in order to shorten the hand-shoveling distance.

Although the conveyor-loader installations of Illinois include some fairly large mines, the famously large producers have been slow to adopt them except in an experimental way. A gradual drop in production at some of the big mines indicates that the number of men on the payrolls is being reduced by natural elimination preparatory to the general adoption of some type of mechanical loading device. The Bell & Zoller Coal & Mining Co. recently installed 50 loaders, at Zeigler; 25 of these are Northerns and the rest Chicago Automatics.

One of the first Indiana companies to install as many as 20 conveyors was the Nickel Plate Coal Co. In December this number of Northern conveyors was installed in the Sunflower mine, at Dugger. Up to December the coal was shot from the solid and hand-loaded. Now it is undercut and loaded over conveyors.

The mining system was otherwise changed by driving 40-ft. rooms instead of 30-ft. rooms. The coal seam is the No. 5, which for the most part contains no regular parting but does contain some refuse which can be discarded at the face. The working height runs from 6½ to 7 ft. Double track is laid in the rooms, and one room neck is made to serve as the haulage outlet for a number of rooms by driving the first breakthroughs nearly in line and laying a main track through them.

According to R. M. Dugger, superintendent, the production per conveyor, each manned with two loaders, had been brought to 35 to 43 tons per day by the last of January. He expected to bring the average up to 50 tons when the facilities became better organized.

With hand loading the cars averaged 3,700 to 4,000 lb. The loading dropped to 3,000 lb. with conveyors but later was raised to 3,450 lb. by adding side boards. Although the mine is working five days per week the men average only about three days because of the division of labor necessitated by the union agreement.

OBVIOUSLY the pit-car loader operates to the best advantage in fairly level beds 6 ft. or more in thickness and in mines of this class which have high cars and which also have dirt-band or drawslate conditions which prohibit the use of mechanical loaders until adequate cleaning plants are installed. But even with low cars and in beds lower than 6 ft.—the limits have not been established—the pit-car loader may be of distinct economical advantage.

With high cars in high coal, users agree that the physical exertion per ton is cut in half at least, even in rooms sufficiently narrow that rehandling is not necessary with hand loading. In wider rooms, where the light type of conveyor loader is taken off of the track and set to load from the corner, or where a swivel or turntable type is used, the decrease of physical effort may be considerably greater than 50 per cent. When loading directly into a car a man must raise his body more or less for each scoop or lump handled. Not so with a pit-car loader, where the total lift is but a few inches.

Coal Mining Institute Discusses

"Lost" Coal of Pennsylvania

At Summer Meeting in Ebensburg

THAT Pennsylvania at one time probably had a trillion or a trillion and a half tons of coal instead of the hundred billion tons which is all it has today, was the declaration of George H. Ashley, State Geologist, at the meeting of the Coal Mining Institute of America held in the Municipal Building, Ebensburg, Pa., on the evening of July 5. The Institute met at the same time of the annual industrial fair in that city. About 200 attended the coal session.

Dr. Ashley declared that the quantity of coal used and wasted in mining operations totaled about ten billion of tons out of a total coal resource in the state of one hundred billion tons of workable coal and one hundred and fifty billions of all kinds of coal. He declared that had the state in prehistoric times not been subjected to stream and glacial erosion, it would have been blessed with one and a half trillion tons, or, more conservatively, at least a trillion tons of coal.

The workable coal of the United States totals 4,223,000,000.000 tons and the total coal about six trillion tons. The entire world has 8,139,-000,000,000 tons of workable coal and about twelve trillion tons of all kinds. Thus Pennsylvania has 2.4 per cent of the whole coal of the United States and 1.2 per cent of that of the entire world whereas the coal of Pennsylvania at one time was equivalent to 36 per cent, or, roughly, one-third the present-dav coal resources of the United States, or to 18 per cent or, roughly, one-sixth of the present-day coal resources of the world.

Even more significantly it may be stated that Pennsylvania lost nine-tenths of its original coal resources by ruthless erosion. Where did it go? Is it to be found, asked Dr. Ashley, in some Southern clime? Perhaps, but not in recoverable quantities. Coal is being removed today just as in the Mesozoic Era, and it may be noted that float due to erosion is rarely found in the streams more than a quarter of a mile from the coal deposit from which it has been torn.

The estimated coal resources of the anthracite region are twenty billions of tons. They cover in all an area of 480 square miles, but that is a geographic measurement, taken not on the seam folds but on a level. The coal bed at one time, of course, was nearly level, but the folding action crumpled the beds so much that five miles of strata occupied in the direction of the line of push only about four miles on an average. Thus 480 square miles of anthracite territory represents perhaps 600 square miles of peat-bog deposition at the time when the beds were laid down.

Assuming the average total thickness of the anthracite coals at 100 ft. there were one hundred million tons per square mile, or sixty billions of tons in all—that is, there was about three times as much anthracite as still remains.

The full section of the coal in the Southern Anthracite Field was 143 ft. 6 in.; of the Western Middle Anthracite Field, 114 ft.; of the Eastern Middle Anthracite Field, 77 ft.; and of the Northern Anthracite Field, 115 ft. It seems fair to take 100 ft. as an average.

The measures in the east of the state, declared Dr. Ashley, are thicker than in the western part. Perhaps this is because they were near the shore line of the big peat bog. This is exemplified not only in the anthracite region but by the Georges Creek region in Maryland, where the coal seams have a total thickness of 78 ft.; by the Elk Garden Pittsburgh coal seam, which is 25 ft. thick, and by the Somerset County coal seams, which are on the edge of the coal measures. Here the aggregate thickness of the seams is 31 ft., yet only the beds below the Redstone are included.

In Greene County, on the other hand, the entire coal thickness is only 25 ft. In Clearfield and Cambria the seams are only 13 ft. thick, but only the lower seams remain. If the upper seams had not been eroded, the entire thickness probably would have been 25 ft., as in Greene County. The Broad Top region, said Dr. Ashley, is along the eastern front of the coal measures, and though only the beds below the Pittsburgh remain, their thickness totals 26 ft. 5 in.

Dr. Ashley explained just how he calculated the total tonnage in the Carboniferous Period. He took the area of the bituminous coal field in the western part of the state as 16,000 square miles. In his table he terms it the "Coal Field Region." He took 16,000 square miles of the rugged country near the Appalachian uplift and termed it the "Vallemont" region. It includes all the anthracite fields and many other coal areas. He denominated the area near the northern line of the state as the "Northern Tier" and then he segregated the southeastern corner, a 7,000-square mile area, because it has not, and doubtless never did have, any coal. Thus he got the accompanying table.

Coal of Pennsylvania in the Carboniferous Era

Region	Square Miles	Thickness, Feet	Tonnage in Billions of Tons	Recalculated Tonnage in Billions of Tons
Coal Field...	16,000	25	400	400
Vallemont....	16,000	50	800	1,000
North Tier...	6,000	16⅔	100	100
S. C. Corner..	7,000	0	0	0
	45,000		1,300	1,500

James R. Campbell, Koppers-Rhéolaveur Co., Pittsburg, Pa., said that few coals were better in grade than those of central Pennsylvania. Because they contained a low percentage of volatile matter, however, they expanded when they coked to such a degree that they were unsuited for use in a byproduct oven. They had been regarded, accordingly, as of no value for byproduct coking. It should never be forgotten, however,

MANY theories for the spontaneous combustion of coal and oil have been propounded. Here is a new one, almost sure to have some little truth in it, but how much truth there may be is left to the determination of scientific experimenters. It is quite likely that flameless combustion will take place before ignition, but will that combustion start at the temperature attained by the other means of heating already recognized, or must a further missing link be discovered?

that if they were blended with coals of higher volatile content their expanding tendency would be corrected and they would make excellent coke

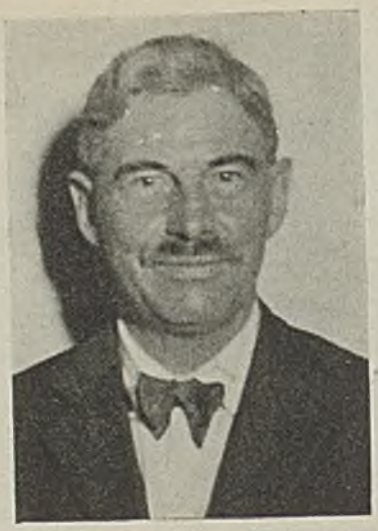
They needed more careful preparation, he said, than they were now receiving if they were to be used for the manufacture of the highest grade of metallurgical fuel, but they submitted so much more effectively to cleaning than most coals that if used for coke making they would without question do their bit in raising the standards of our metallurgical products, now faced with a decline in quality, due to the use of fuel relatively high in sulphur.

William M. MacGillivery, Dow Chemical Co., Midland, Mich., described the method of rendering coal dustless by spraying with Koltreat. He said that the chief chemical in the preparation was calcium chloride, but that a small quantity of magnesium chloride was present and almost no sodium chloride. A neutralizing acid was added.

Oscar Cartlidge, consulting engineer, Charleston, W. Va., had prepared a paper for the meeting which was presented by Francis Feehan, U. S. Bureau of Mines, Pittsburgh, Pa. It described the possible causes for gob fires on the surface and the means that might be provided for their avoidance. The author stated that in five explosions at gob piles six men had been killed. He quoted W. L. Affelder, Hillman Coal & Coke Co., Pittsburgh, Pa., as suggesting that the right to remove coal from gob piles be leased to contractors. Gob piles, said Mr. Cartlidge, should be kept shallow by a wide scattering of the dumped material. Some had suggested that it be cast in layers 2 ft. thick and compressed with a heavy roller.

The author having said that coal in dumps was the cause of fires, R. D. Hall remarked that there was oil enough in some shales to cause ready spontaneous ignition even in the cleanest of rock piles. Some of the oil in these beds doubtless has been reduced to fine carbon and in anthracite shales probably all of it has been.

HE PRESENTED with much caution a suggestion as to the possible cause of spontaneous combustion, designating it as nothing more than a hazardous guess, which, however, would justify experimentation. Prof. Arthur Bone, formerly of Sheffield University, England, had stated that electrolytic gas, consisting



George H. Ashley

of hydrogen and oxygen in the proportion to form water, when kept in a glass flask in a darkened room would glow with light, showing that a low form of combustion without appreciable heat occurs. The phenomenon is known as chemiluminescence. A highly explosive gas thus burns flamelessly and without explosion.

Mr. Hall also drew attention to the fact that methane, or marsh gas, burned in marshes without perceptible generation of heat but with the emission of light. This gave rise to the phenomenon known as the "Will-o'-the-Wisp." The speaker declared that such evidences of chemiluminescence would not justify a theory of spontaneous combustion, but they did illustrate the possibility that under certain favoring circumstances, or even without them, combustion could take place at temperatures well below those we commonly associated with that phenomenon. Corrosion is a similar low-temperature combustion the occurrence of which suggests that the phenomenon that results in flame may exhibit itself without flame at extremely low heat values.

He said that Dr. Bone had shown that gas could be burned on the surface of refractories without flame but with the emission of great heat, and that this combustion would originate at temperatures below those necessary for flaming combustion.

It was necessary to suppose, Mr. Hall said, that the coal was raised in temperature to a certain critical degree by some of the well-known causes of temperature increase—oxidation of pyrite, adsorption of oxygen or perhaps adsorption of carbon dioxide, which Professor Sinkinson, of Lehigh University, had shown caused greater heating than adsorption of oxygen.

Mr. Hall said also that Professor Sinkinson had played an explosive mixture of gas and air on a block of anthracite and had noted the hissing sound of flameless combustion and the development of heat. He declared that the earthy constituents of coal might aid in the action as catalysts, these constituents assisting in the combustion without having their own chemical status changed. The action of catalysts sometimes is enhanced when two catalysts are used, and it is significant that frequently two coals of different origin when mixed will ignite spontaneously more speedily than one.

Water vapor is said to be essential to the combustion of methane, into which combustion it actually enters, not merely as an end product but as a reagent. For this purpose it need be present only in the smallest proportions, but the larger presence of water may be one cause of accelerated action in flameless combustion. Certainly water has been found to aid mysteriously in the spontaneous ignition of coal.

CARBON which has taken up oxygen into its microscopic crevices is said to be activated. The oxygen is more ready to react than in its natural state. Coal, like carbon, but in less degree, adsorbs oxygen and becomes activated, and this may be one reason for surface combustion of methane on coal.

The ascription of spontaneous ignition to a flameless combustion of already heated coal, or other combustible masses, may, said Mr. Hall, be the "baseless fabric of a dream," but it might be well nevertheless for someone to give it a careful test. It may succumb like other much heralded theories, or it may prove to have an important part in the chain of causation.

On the following day—Saturday—a first-aid contest was held in the arena at the fair grounds, at which 45 teams contested for the Pennsylvania championship. The Buckeye Coal Co. team of Nemacolin, Pa., took first place with 99½ per cent, and the Consolidation Coal Co. team of Acosta, Pa., took second place with a score of 99¼ per cent. Charles M. Schwab awarded the first prize and William Nesbit the second. The Coal Mining Exhibit in the Fair Grounds was larger and better than ever.

Illinois Forging Ahead in

MECHANIZATION

Says State Mining Institute

FORTY-FIVE per cent of the coal produced in Illinois during May last was loaded by mechanical means; there are now in use underground in the mines of this state over 200 mechanical devices for removing the coal from the face and loading it into mine cars, as well as 1,000 or more pit-car loaders which lift the coal into the cars when it has been delivered to them by hand shovel.

These statistics were given by J. D. Zook, commissioner, Illinois Coal Operators' Labor Association, in a talk at the annual summer meeting of the Illinois Mining Institute.

Leaving St. Louis in the evening of June 27, on board the river boat "Cape Girardeau," the Institute took its twelfth boat trip on the Mississippi River, in the region made famous by Mark Twain, going upstream as far as Burlington, Iowa, and returning to St. Louis on June 30.

Mr. Zook feels that Illinois is making rapid headway in its program of mechanization. He expects that the progress of mechanization will be increasingly accelerated in the state, particularly in the fall, when demand for coal will be brisker than it is now. The Operators' Labor Association, he said, had become eminently necessary because operating conditions never before in the history of the industry changed so rapidly. Mechanization is almost entirely responsible for this rapidity of change. Questions of labor are being viewed and handled in a new light. The revisions in the wage scale made last September helped to create the association and to establish it in its present form. He expressed gratification over the defeat of the so-called "bug-light" bill.

John E. Jones, president of the institute, said that, due in part to mechanization, the industry is moving ahead fast—so fast that the great difficulty is to solve its problems as quickly as they arise. This difficulty can be met only by a release of information and an interchange of experiences and ideas through institutes and other mediums.

"Better Business Bureau Activities as Applied in the Coal Industry" was the title of a paper presented by Frank F. Tirre, special representative of the St. Louis division of that bureau. The aim of the bureau is to prevent misrepresentation and to establish and enforce standards for the merchandising of products. His job has to do with coal as merchandised in the St. Louis area and his contact in the work is with retail dealers. A law in Missouri provides that those who sell coal must submit to the buyer on delivery a certificate giving the weight, quality, kind and character of the product. The Better Business Bureau of St. Louis has undertaken to encourage adherence to the standards in advertising as well as in selling. The bureau has set up standards of practice of its own to supplement and amplify the spirit and intent of the law.

All the well-known coal dealers in St. Louis are willingly co-operating with the city and the bureau in checking up irregularities. Substitutions are being run down, and it is felt that in time the honest business and quality behind grades and trade names will be protected from misrepresentation.

John Griffin, manager of sales, Koppers - Rheolaveur Corporation, discussed the economic aspects of mechanical coal cleaning. He stated that about 40 per cent of the coal mined in England and 60 per cent of that mined in Continental Europe is cleaned mechanically. In his talk he described European practices and trends as he had observed them during his recent visit.

What struck him most forcefully is the willingness of Europeans to spend vast sums on modern cleaning plants. As an example of this he cited the case of a coal company in Durham County, England, which invested half a million dollars on a cleaning plant for cleaning 2 in. to zero coal at the rate of 250 tons per hour. Cleaning plants abroad are good looking, substantial and are constructed of concrete, steel and

Members of Illinois Mining Institute Preparing to Embark for Summer Boat Trip Meeting

glass. The design is so meticulously worked out that maintenance costs are low.

The afternoon session on June 28 was under the chairmanship of A. C. Callen and the first speaker was Dr. M. S. Ketchum, dean of the engineering school, University of Illinois, whose subject bore on mining education and the mining industry. He wondered why the engineer is not cultivated by the coal industry and saw in this profession a broad opportunity for youth. As a general statement he declared the industries which absorb the largest numbers of technically trained men are the most prosperous. Railroads, he added, cannot hope to be consistently prosperous owing to their light regard for the engineer. He cited a statement once made to him by Colonel Reese, director of personnel, American Telephone & Telegraph Co., maintaining that a college man arrives at a position of responsibility at an age six to ten years younger than the man without scholastic training.

John A. Garcia, of Allen & Garcia Co., Chicago, showed motion pictures of last year's boat trip and supplemented these by pictures which he took in Continental Europe. George Anderson, assistant vice-president, Peabody Coal Co., presented industrial motion pictures of gasoline motors, from the library of the U. S. Bureau of Mines. E. J. Weimer, superintendent of the Wildwood mine, the new coal property of the Butler Consolidated Coal Co., Wildwood, near Pittsburgh, Pa., gave a description of this new plant, now in process of construction.

According to Mr. Garcia, who introduced him, the speaker characterized the plant as the fulfillment of an engineering ideal. The ideas it embodied and the calculations on which it was based were the result of twenty years of dreaming and planning. The property had been well proved by boreholes and calculations, and plans had been most carefully made at a cost of about $100,000 before ground was broken. When completed the plant will produce 5,000 tons of coal in eight hours from the Double, or Thick, Freeport seam. The cost of the plant will be about $3,000,000, of which amount about $500,000 will be spent on a cleaning plant.

The intention is to "mill" the coal through the plant as ore is treated in metal mining. Every pound of coal produced at this mine will be passed through the preparation process, which is to be of the Peale-Davis pneumo-gravity, air type. At this plant, Mr. Garcia believes, it will be possible to get a yield of about 15 tons for every man employed above and below ground. Coal is to be loaded mechanically.

According to Mr. Weimer, the property includes about 5,000 acres of coal, which is reached by a double-deck slope, one portal for man travel and the other for the hoisting of coal to the tipple for which a belt conveyor on about an 18-deg. inclination will be used. All mining equipment underground is to be government-approved. In the Thick Freeport seam are a top and a bottom bench of coal divided by a 12- to 14-in. bony parting. This band is at present being removed by an Oldroyd cutter, which also is used for shearing the places. At present entries only are being driven. The development places are driven by triple shift, at least three cuts being loaded out by Joy machines from each place every 24 hours, and sometimes four.

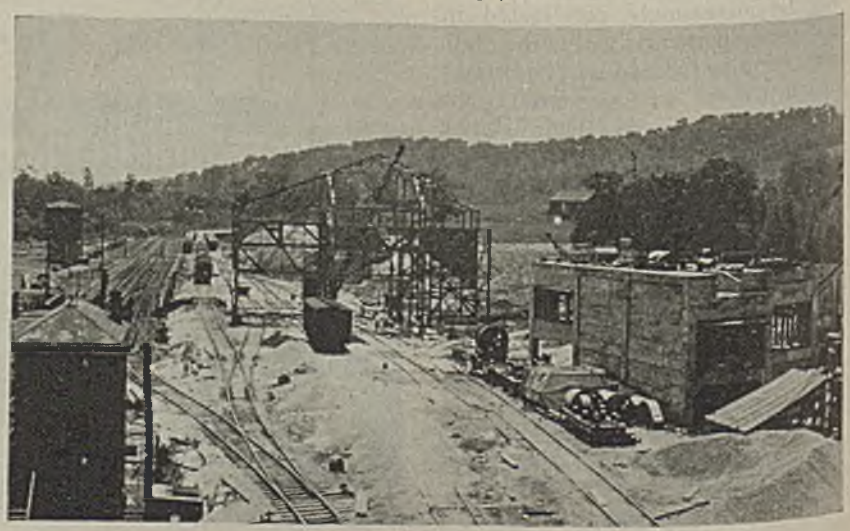
Cutting and loading machines are to be served by two 300-kw. full-automatic portable motor-generator sets. The control apparatus is mounted on a truck and incased in a dust-proof steel housing. It will be possible to move the set from one position to another and resume operation in less than four hours.

Mr. Garcia explained that when the mine is beyond the development stage and the top works completed, no distinction will be made between coal and refuse. The loading machines will take everything and every pound of coal produced will pass through the cleaning plant. It is likely that the refuse will be taken back into the mine and stowed there.

The need for a system or channel of some sort for disseminating details of mine accidents in Illinois to all operators was emphasized by Mr. McFadden. Mr. Zook said he would be glad to utilize the facilities of the operators' labor association for getting out such information if the operators desired it. Glenn Southward, mechanization engineer, American Mining Congress, in a brief talk on mechanization said that Illinois now ranks ahead of Wyoming in the proportion of total state output loaded mechanically.

The last session was occupied by a talk on Colombia, South America, by Dr. H. Foster Bain, secretary, American Institute of Mining and Metallurgical Engineers; by a question-box discussion, which, incidentally, dealt largely with the propriety of certain phases in coal advertising, and lastly by business matters. W. C. Coddington, of the Solvay Sales Co., St. Louis, explained the whys and wherefores of using calcium chloride for assuring a dustless coal. The cost of treating coal with a solution of this salt is between 10c. and 15c. per ton, he said. A ton of coal requires about three gallons of an 18-per cent solution, an equivalent of 5¼ lb. of the solid salt. The institute now has under consideration a recommendation that its scope be broadened to embrace all Middle Western fields and that its name be changed to the Mississippi Valley Institute. The fall meeting may be held either at Danville or Decatur in November.

Tipple in Course of Construction at Wildwood Operation of the Butler Consolidated Coal Co., Near Pittsburgh, Pa.



UNDER-FLOOR WIRES

Insure Mine Phone Service

Tending the Switchboard Is Part of the Dispatcher's Job

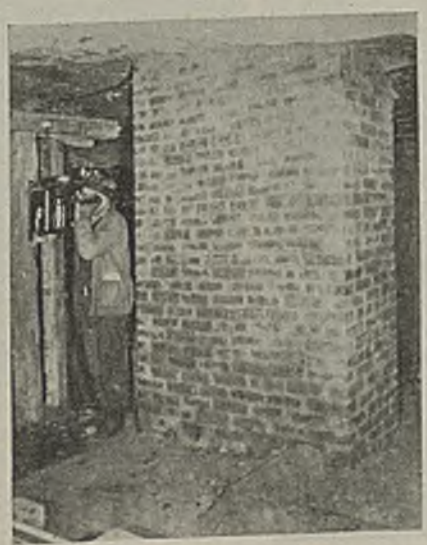
RAPID communication is essential for efficient management of any business, and mine operation is no exception. For car dispatching alone the telephone is indispensable. It also conserves the time of operating officials, expedites the delivery of emergency material, facilitates quick repair of equipment, and may be a life saver in case of personal injury or disaster.

But, usually, in case of an explosion, the telephone wires are torn down and the system rendered entirely inoperative for communication with entombed men or for rescue work. This in itself is sufficient reason for placing the telephone wires in ducts in the mine floor, though the more every-day reason is to prevent service interruptions and cut down the line maintenance cost. Up to last year the use of an extensive duct system in this country was limited to one mine, but now at least five large bituminous operations are so equipped or have systems in the process of installation.

For several years the Nemacolin mine of the Buckeye Coal Co., a subsidiary of the Youngstown Sheet & Tube Co., has been equipped with a bottom duct telephone system. Last fall the parent company made the same type of installation in its Dehue mine in Logan County, West Virginia. This system, which involves over 12,000 ft. of duct, is illustrated in the accompanying photographs.

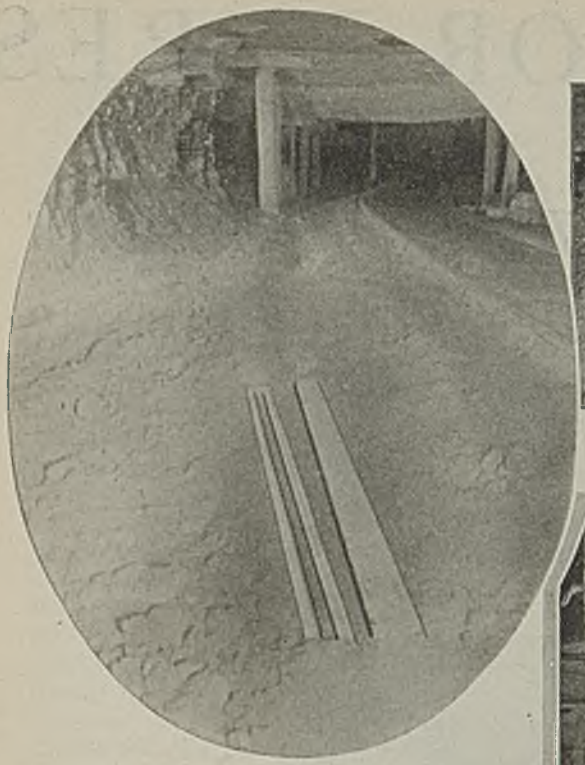
The telephone central is in the dispatcher's office at the shaft bottom. Herein is located the ten-line magneto switchboard which serves the several inside lines and one outside line. The car dispatcher operates the board and also acts as a timekeeper.

Brick Pillar Protecting Terminal Of a 6-Pair Branch Cable

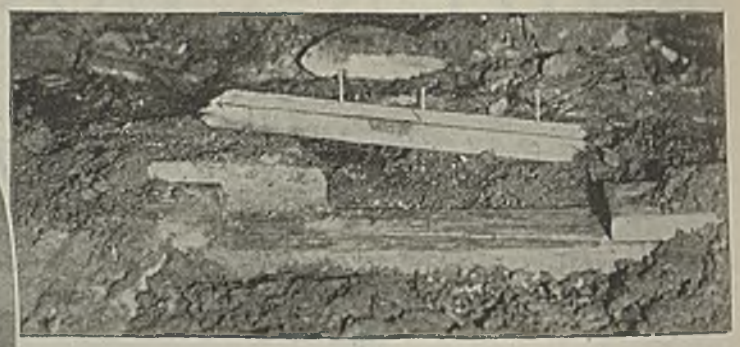


The lines leave the switchboard in an 11-pair paper-insulated lead-covered cable which extends along the clearance side of the main haulway to a junction 5,820 ft. from the shaft bottom. From here two 6-pair cables of the same type radiate to section side tracks. One of these 6-pair cables is 2,700 ft. long and the other 3,700 ft. The cable conductors are No. 19 B. & S. gage copper, and the cable diameter over the lead sheath is approximately $\frac{1}{16}$ in. for the 6-pair and $\frac{5}{8}$ in. for the 11-pair.

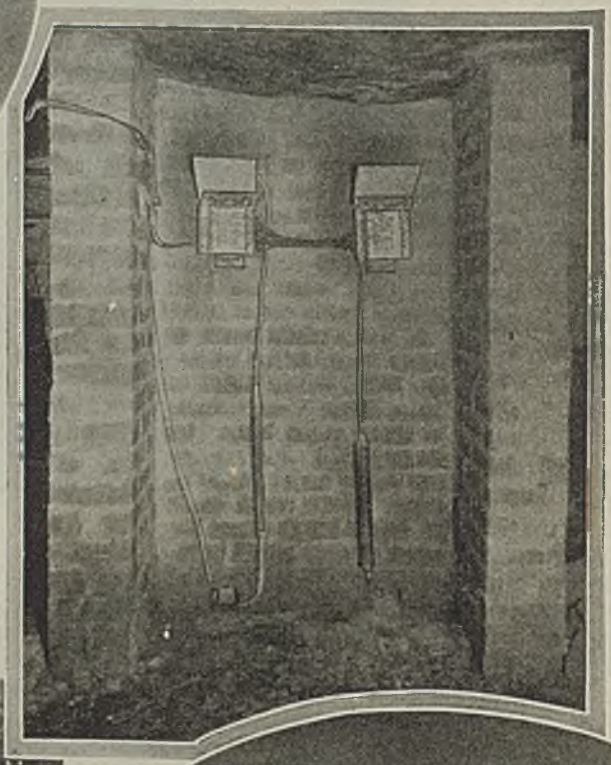
Strips of $\frac{3}{4}$-in. poplar are used to form a duct, measuring 1x1 in. inside, for the lead cable. This wood duct is surrounded by 3 to 4 in. of concrete. For the most part the bottom was not trenched for the duct but instead only the loose material was moved. The wet concrete was then poured in a row or hump along the bottom, the wood duct containing the cable placed on top of it, and



Inspection Hole With Cover Removed

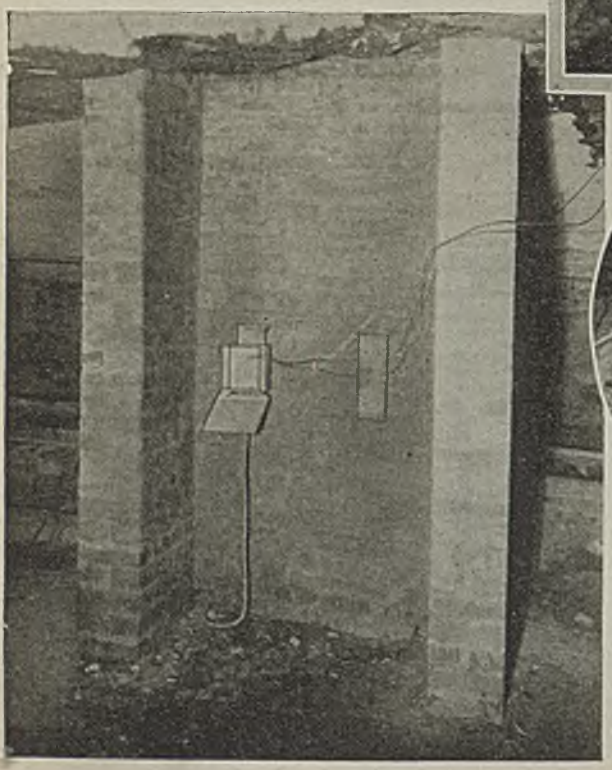


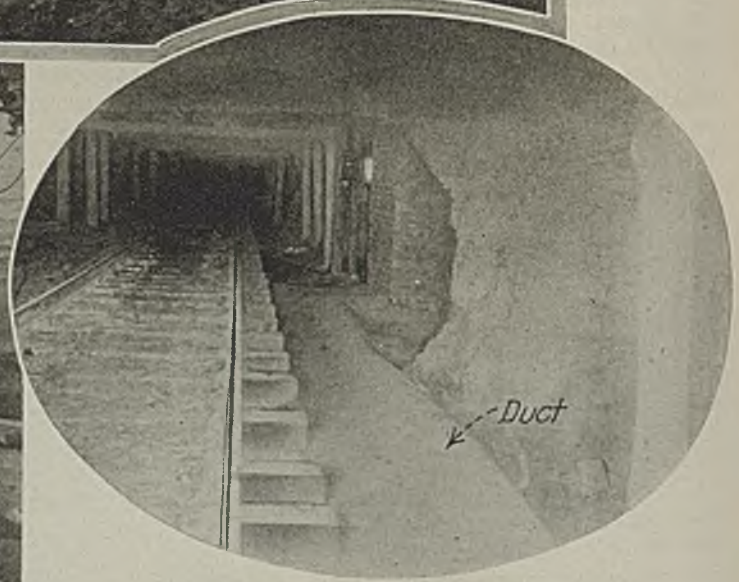
Insulating Joint Where Duct Is Poured Full of Paraffin



Test Station With Connections Between Terminal Boxes

Terminal of 6-Pair Cable With One Outgoing Open Line





The Duct Is in a "Hump" of Concrete Beside the Track

a covering of concrete then applied.

Every 150 ft. a strip of wood 4 ft. long was placed in the duct cover and the concrete omitted from the top, thus providing an inspection hole and one for use possibly in pulling out a 150-ft. length of the cable to make repairs. At points 150 ft. apart and also on each side of branch tracks under which the cable is carried, sheath insulating joints are installed. Here the lead sheath is entirely cut away for a length of 2 in., and around the open wires and for a distance of about 6 in. each way the wooden duct is poured full of paraffin. This construction is to minimize the tendency for stray current to flow through the lead sheath and puncture it by electrolysis at the points where that current might leave the sheath.

About every 1,000 ft. the cable is brought up to two terminal boxes located in the recess of a brick pillar built for that purpose. These pillars clear the track by 42 in. or more and, where possible, are placed even with or back of the rib line. These are used for test stations and for junctions with open wire lines. The terminal box at the end of each 6-pair cable is protected by the same construction. The pillar wall is 9 in. thick and the pocket in the back 19 in. deep and 38 in. wide.

At present the lead cables extend to within 2,000 ft. of the working faces, and there is not a great deal of open wiring. The lead cables will be extended as development takes place.

Although the mine is on closed lights and the new equipment recently purchased is of the permissible type, ordinary cast-iron case telephones are used. Inside of each there is mounted a 50-watt lamp which burns continually and thus keeps the coils and insulation warm and prevents damage by moisture.

Inasmuch as the bottom is dry for the most part on the entries where the telephone duct is installed, the construction has not demonstrated whether or not it would be satisfactory for all conditions. So far the maintenance cost has been small compared with that when all of the telephone wiring was open work. At that time all of the wiring was inspected and repaired, where necessary, each day.

Texas Plant Burns Lignite

TEXAS LIGNITE with proper equipment makes an acceptable industrial fuel and is so being used at the new station of the Texas Power & Light Co. near Trinidad, Texas. The station was not erected at the mines because adequate water-cooling facilities for the exhaust were desired. Means of preventing combustion by tractor and roller and by shutting out air at the sides of the piles and the use of the combustible in pulverized form are notable features in the installation.

The Texas and interconnected companies, according to E. T. Keck, superintendent, writing in *Electrical World*, serve an area of widely separated towns and cities and a low density of rural population. Consequently, the selection of a station site involved careful study to determine the probable future load center so that the station might be developed to its economical capacity without involving too great a transmission problem. After investigation of fuel resources and water supply, the above location, on the Trinity River and 10 miles from a lignite field was chosen.

Steam is supplied by four Babcock & Wilcox cross-drum sectional-header type boilers with interdeck superheaters for a steam pressure of 425-lb. gage and an outlet temperature of 750 deg. F. The boilers are fired from the rear or drum end through flat arches, the furnace volume being 18,540 cu.ft. above the ashpit, giving a combustion chamber volume of 0.988 and 0.871 cu.ft. per square foot of boiler surface and heating surface, respectively. Combustion control is manual.

The generating equipment consists of two General Electric turbo-generators with 20,000-kw. 1,800-r.p.m. fourteen-stage turbines and 25,000-kva. 12,000-volt 3-phase 60-cycle generators. Steam is supplied the turbines at 375 lb. gage and 700 deg. F. The capacity of the present equipment is 40,000 kw., but provision has been made to expand to 160,000 kw. if future demand warrants.

Reliability and continuity of fuel supply are assured by proximity to the mines and, though most of the fuel will be supplied from shaft mines, deposits of lignite sufficient for six months' operation have been stripped in advance so that coal can be delivered to the station by only a shovel and train crew. In addition, a month's supply is stored at the plant against failure in deliveries.

The lignite used at Trinidad has an average analysis as follows: Moisture, 33.73 per cent; volatile matter, 21.1 per cent; fixed carbon, 35.93 per cent; ash 9.12 per cent; sulphur, 0.48 per cent and a calorific value of 7,000 B.t.u. per pound. Tests were made before selecting the combustion equipment and the pulverized fuel system was chosen in preference to stokers. The lignite is delivered in 50-ton bottom-dump cars, weighed, dumped into a track hopper and conveyed to single-roll crushing machines arranged two in series with vibrating screens between. Magnetic pulleys remove the tramp iron.

From the crushers the coal is carried over weightometers, usually to the fuel-preparation bay, as the storage yard is seldom called upon to supply fuel. There it is dumped into bunkers. Driers of the steam-grid type are located under the bunkers and are supplied with steam at 10-lb. gage. The pulverizing mills are at the basement floor level, each directly under its drier, the mill exhausters and drier fans being placed on a floor between the two. The pulverized lignite is withdrawn from the mills and discharged into cyclone separators on the top floor of the pulverizing bay. Screw conveyors transport the pulverized lignite from the cyclone discharges to the storage bunkers in the aisle between and above the boilers. The entire fuel conveyor system from the conveyors to the bunkers is in duplicate.

The pulverized lignite is drawn from the bunkers by helical feeders and blown vertically downward into the furnaces through fantail burners. Each boiler is served by twelve burners and feeders, arranged in groups of six, independently driven and controlled. The ashpit floors slope to the rear of the furnace, and the ashes are drawn thence into water-sealed drag-scraper conveyors, transported to a cross-conveyor, elevated to a bunker by a skip hoist and dropped into dump cars for transportation to low ground near the station.

When lignite was first placed in storage it caught fire spontaneously on the slopes of the pile, particularly on the windward side and where the pile was improperly packed. To protect the dump from this danger earth dikes were built around three sides of the storage area and the lignite spread in 2-ft. layers, leveled and packed down with tractor and roller.

Approved List of PERMISSIBLE EXPLOSIVES

Reissued 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, as follows: (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 gas, but they produce at the same time a much larger volume of non-poisonous gas. 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 gas, 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 gas 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 entry, 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 gas produced by 1½ lb. (680 grams) of the explosive is thus listed by the Bureau:

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

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

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

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

Class 1, Ammonium Nitrate Explosives.—All 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 nitrosubstitution 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 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.—All explosives in which salts containing water of crystallization are the characteristic ingredients. The explosives of this class are somewhat

Permissible Explosives as of June 30, 1929

Brand	Class Designation Basis: Volume Poisonous Gases	Class Designation Basis: Characteristic Ingredient	Weight of 1¼x8 In. Cartridge, Grams	Smallest Permissible Diameter, In.	Unit Deflective Charge, Grams	Rate of Detonation in 1¼ In. Diameter Cartridge, Ft. per Second	Manufacturer †
Apache Coal Powder A	B	Ia	137	1¼	222	11,710	1
Apache Coal Powder B	B	Ia	158	1¼	241	8,200	1
Apache Coal Powder D, L. F.	A	Ia	160	1¼	235	10,820	1
Apache Coal Powder E, L. F.	A	Ia	162	1¼	230	11,250	1
Apache Coal Powder F, L. F.	A	Ia	160	1¼	225	11,090	1
Apache Coal Powder S	B	Ia	181	1¼	303	5,710	1
Austin Red Diamond No. 1-D, L. F.	A	Ia	147	1	225	12,430	3
Austin Red Diamond No. 2-A, L. F.	A	Ia	175	1	252	10,760	3
Austin Red Diamond No. 6-A, L. F.	A	Ia	176	1	220	13,610	3
Austin Red Diamond No. 8, L. F.	A	Ia	169	1	217	8,230	3
Austin Red Diamond No. 9, L. F.	A	Ia	134	1	223	6,330	3
Austin Red Diamond No. 9-A, L. F.	A	Ia	142	1	208	7,510	3
Austin Red Diamond No. 10, L. F.	B	Ia	124	1	248	8,070	3
Austin Red Diamond No. 12, L. F.	B	Ia	99	1	242	9,120	4
Austin Red Diamond B, L. F.	A	Ia	147	1	205	11,380	3
Austin Red Diamond F, L. F.	B	Ia	142	1¼	207	8,460	3
Austin Red Diamond G, L. F.	A	Ia	162	1¼	237	6,760	3
Austin Red Diamond T S.	B	Ia	130	1¼	223	7,050	3
Austin Red Diamond U L.	B	Ia	114	1¼	240	8,460	5
Big Red No. 1	B	Ia	171	1	240	7,250	5
Big Red No. 7	A	Ia	186	1	227	10,000	5
Bituminite 1	C	4	187	1¼	318	12,790	8
Bituminite 5	A	Ia	176	1¼	231	9,120	9
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	Ia	180	1	288	6,040	9
Black Diamond No. 5, L. F.	A	Ia	175	1	222	8,590	9
Black Diamond No. 6, L. F.	C	4	158	1¼	306	9,640	9
Black Diamond No. 7	A	Ia	183	1	214	10,730	9
Black Diamond No. 15	A	Ia	160	1	217	6,560	9
Black Diamond No. 17	A	Ia	172	1	222	10,790	4
Carbonite No. 5	C	4	175	1¼	304	10,140	

(Continued on following page)

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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.—All explosives in which the characteristic ingredient is an organic nitrate other than nitroglycerin. The permissible explosives now listed under this class are nitrostarch explosives.

Class 4, Nitroglycerin Explosives.—All 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.—All explosives in which the characteristic ingredient is ammonium perchlorate.

Class 6, Gelatin Explosives.—All explosives in which the nitroglycerin is gelatinized with nitrocotton. Explosives of this class have been grouped together at the end of the list because they have been specially designed for blasting rock 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 6,000 and 15,000 ft. per second.

The complete active list of permissible explosives and blasting devices tested prior to June 30, 1929, is shown in the accompanying table.

A permissible approved by the U. S. Bureau of Mines is Cardox, of the Safety Mining Co. This explosive falls within Class A. Its propulsive strength depends on the thickness of the replaceable disk, the weight of the heater ingredients and the weight of the carbon dioxide charge. A charged shell of Cardox has strength ranging from that of 290g. of Pittsburgh Testing Station 40 per cent straight nitroglycerin dynamite up to 463g. of the same explosive.

Permissible Explosives as of June 30, 1929—(Continued)

Brand	Class Designation Basis Volume Poisonous Gases	Characteristic Ingredient	Weight of 1¼x8 In. Cartridge, Grams	Smallest Permissible Diameter, In.	Unit Deflective Charge, Grams	Rate of Detonation in 1¼ In. Diameter Cartridge, Ft. per Second	Manufacturer †
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	Ia	166	¼	204	11,580	2–7
Coalite B, L. F.	B	Ia	138	¼	205	11,380	2–7
Coalite C, L. F.	A	Ia	168	¼	215	12,200	2–7
Coalite D, L. F.	A	Ia	154	¼	214	12,070	2–7
Coalite E, L. F.	A	Ia	168	¼	237	6,230	2–7
Coalite F, L. E.	B	Ia	180	¼	362	4,620	2–7
Coalite G, L. F.	A	Ia	152	¼	218	7,970	2–7
Coalite H, L. F.	A	Ia	180	½	260	6,360	2–7
Coalite I, L. F.	A	Ia	168	¼	267	9,250	2–7
Coalite K, L. F.	B	Ia	101	½	224	9,380	2
Coalite M, L. F.	B	Ia	124	¼	207	9,640	2–7
Coalite S, L. F.	B	Ia	138	½	213	7,710	2–7
Coalite T, L. F.	A	Ia	139	¼	224	5,970	2–7
Coalite Y	B	Ia	164	¼	235	10,300	2–7
Coalite No. 4, L. F.	B	4	150	¼	307	7,810	2–7
Collier B	B	Ia	156	¼	207	10,960	8
Collier C, L. F.	A	Ia	141	¼	217	11,970	8
Collier X, I, F. 2	A	Ia	165	¼	228	9,970	8
Duobel No. 2, L. F.	A	Ia	143	¼	209	9,970	4
Duobel, L. F.	A	Ia	147	¼	225	12,430	4
EP-28	A	Ia	116	¼	220	10,170	8
General 1	A	Ia	168	¼	208	10,660	4
General 6-X	A	Ia	194	½	220	10,500	4
Genite A	A	Ia	163	¼	223	11,100	6
Genite F	B	Ia	143	½	211	8,080	6
Genite M	B	Ia	124	½	223	9,220	6
Grasselli I.C, L. F.	A	Ia	160	¼	216	5,940	4
Grasselli 2, L. F.	B	Ia	142	¼	221	10,860	4
Grasselli 5, L. F.	A	Ia	156	¼	223	7,680	4
Grasselli 6, L. F.	A	Ia	162	¼	218	9,220	4
Grasselli 7, L. F.	A	Ia	131	¼	217	8,000	4
Grasselli 10, L. F.	A	Ia	124	¼	221	8,270	4
Hercoal C	B	Ia	116	¼	220	10,170	8
Hercoal F	B	Ia	92	½	231	9,120	8
Hercules Coal Powder 2	A	Ia	186	½	212	9,280	8
Mine-ite No. 5-D	A	Ia	161	¼	241	8,720	4
Mine-ite No. 6-D	A	Ia	169	¼	224	8,100	4
Miners Friend No. 1	B	Ia	167	¼	223	11,580	2
Miners Friend No. 2	B	Ia	166	¼	242	10,330	2
Miners Friend No. 4, L. F.	B	Ia	166	¼	249	9,970	2
Miners Friend No. 5, L. F.	B	Ia	166	¼	250	8,560	2
Miners Friend No. 6, L. F.	B	Ia	176	¼	224	10,890	2
Monobel No. 1, L. F.	A	Ia	175	¼	231	12,860	4
Monobel No. 2, L. F.	A	Ia	175	¼	252	10,760	4
Monobel No. 4, L. F.	A	Ia	170	¼	252	10,760	4
Monobel No. 5, L. F.	A	Ia	176	¼	249	6,400	4
Monobel No. 6, L. F.	A	Ia	169	¼	220	13,610	4
Monobel No. 8, L. F.	A	Ia	134	¼	217	8,230	4
Monobel No. 9, L. F.	A	Ia	142	¼	223	6,330	4
Monobel No. 9-A, L. F.	B	Ia	124	¼	208	7,510	4
Monobel No. 10, L. F.	A	Ia	123	¼	248	8,070	4
Monobel No. 11, L. F.	B	Ia	99	¼	222	9,050	4
Monobel No. 12, L. F.	B	Ia	148	¼	242	9,120	4
Peerless No. 1	A	Ia	164	¼	217	11,050	10
Peerless No. 2	A	Ia	152	½	212	8,400	10
Peerless No. 4	A	Ia	153	½	220	6,560	10
Peerless No. 6	B	Ia	126	½	222	6,530	10
Peerless No. 8, L. F.	B	Ia	130	½	223	9,220	10
Peerless No. 10, L. F.	A	Ia	163	¼	222	9,680	10
Pennsylvania Coal Powder B, L. F.	A	Ia	163	¼	223	11,100	11
Pennsylvania Coal Powder C, L. F.	A	Ia	155	¼	233	10,220	11
Red H. B., L. F.	A	Ia	168	¼	213	12,140	8
Red H. C., L. F.	A	Ia	150	¼	216	5,870	8
Red H. D., L. F.	A	Ia	130	¼	214	7,740	8
Red H. F., L. F.	A	Ia	164	½	210	7,450	8
Red H. J., L. F.	B	Ia	167	¼	209	7,540	8
Red H. No. 1	B	Ia	164	¼	216	11,710	8
Red H. No. 4	B	Ia	170	¼	248	8,990	8
Red H. No. 4-A, L. F.	B	Ia	170	½	227	9,350	8
Red H. No. 5	B	Ia	162	¼	267	6,760	8
Red H. No. 6	B	Ia	151	¼	218	10,360	8
Red H. No. 14	B	Ia	130	¼	236	10,460	8
Tristate Special No. 1	A	3	178	¼	223	7,050	13
Trojan Coal Powder M-2	A	3	184	¼	232	10,660	12
Trojan Coal Powder M-3	A	3	188	¼	229	12,000	12
Trojan Coal Powder M-5	A	3	190	¼	230	12,790	12
Trojan Coal Powder M-6	A	3	154	¼	242	11,810	12
Trojan Coal Powder P-1	B	3	174	¼	224	9,380	12
Trojan Coal Powder P-2	B	3	176	¼	226	12,890	12
Trojan Coal Powder P-3	B	Ia	114	¼	230	13,280	12
Unilite No. 1	B	Ia	103	¼	240	8,460	13
Unilite No. 2	B	Ia	165	¼	244	8,100	13
Union A, L. F.	B	Ia	162	¼	214	11,680	13
Union B, L. F.	A	Ia	163	¼	248	10,270	13
Union D, L. F.	B	Ia	142	¼	223	11,090	13
Union F, L. F.	A	Ia	162	¼	207	8,460	13
Union G, L. F.	B	Ia	147	¼	237	6,760	13
Union H, L. F.					217	8,430	13

Gelatin Permissible Explosives

	Rate of Detonation May Vary 6,000 to 15,000 Ft. per Second						
Coal-Gel No. 1	A	6	224	¼	267	8,430	13
Coal-Gel No. 2	A	6	226	¼	273	10,400	13
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	2–7
Gelite 1 L. F.	A	6	248	¼	255	8,330	4
Gelobel, L. F.	A	6	236	¼	259	15,250	4
Gelobel No. 3, L. F.	A	6	247	¼	259	7,770	4
Hercogel	A	6	241	¼	257	8,690	8

*These explosives are permissible only when used in accord 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 Mfg. Co. and Egyptian Powder Co., [6]General Explosives Co., [7]Giant Powder Co. (Con.), [8]Hercules Powder Co., [9]Peerless Explosives Co., [10]Pennsylvania Powder Co., [11]Trojan Powder Co., [12]Union Explosives Co.

Coal Age

Sydney A. Hale, *Editor*

New York, July, 1929

New editorial leadership

THE PUBLISHERS take pleasure in announcing the appointment of Sydney A. Hale as editor of *Coal Age*, effective July 1.

Mr. Hale has been on the editorial staff of *Coal Age* since January, 1925, and has been managing editor since January, 1928. For the past six months, following the transfer of John M. Carmody from the editorship of this publication to that of *Factory and Industrial Management*, Mr. Hale has been in charge of the editorial conduct of *Coal Age*. He now becomes the fifth to hold the responsible position of editor since the establishment of the magazine in 1911. Through his wide acquaintance in the coal industry and his familiarity with its economic problems, combined with his experience and skill as a journalist and the support of an able technical staff, the publishers look forward with confidence to the continuation of service of a high order to the coal-mining industry.

Malcolm Muir,
President.

Heroes of peace

THE CELEBRATION of Light's Golden Jubilee, which will reach its climax Oct. 21 at Dearborn, Mich., when Thomas A. Edison will re-enact the scene at Menlo Park that marked the birth of the successful electric lamp, is a well-deserved tribute to one whose inventions have made the world his debtor. The creation of successful electric lighting was an achievement the full possibilities of which neither industry nor the home has yet completely realized. Focusing of public attention on the fiftieth anniversary of the lamp cannot do otherwise than give fresh impetus to the study of these possibilities, and that impetus will not be among the least of the tributes paid to Mr. Edison.

But there is something bigger in this celebration than even the electric light or any other single invention. Most of the celebrations of the past have been staged to do homage to the sons of Mars for their ruddy victories of destruction. Battles have been the backbone of history as history commonly has been written. The conquest of men has excited more panegyrics than the conquest of nature; the Cæsars have won more popular acclaim than the Watts. In honoring Mr. Edison, however, the world is pausing to pay tribute to the heroes of peace.

In a universe groping to wipe out the lust for war this exaltation of the peaceful arts may be made profoundly significant. Because the discoveries of the industrial laboratory so soon become a part of the stream of daily living their drama often is lost. Mass acceptance has made the electric light, the telephone, the automobile and the radio commonplace. It is wise, therefore, to recreate the thrill of their discovery, to surround them with the glamour that rightfully belongs to all great deeds. By so doing it will be easier to impress upon the rising generation that he who adds to the art of living is as worthy of emulation as he who stays destruction by a greater destruction.

From wood to steel

MECHANIZATION will accelerate the tendency to replace timber props and sets by steel supports. Longwall and long-face workings with their increased roof pressures will make steel necessary, both because wood has inadequate strength and because it cannot be made, like steel, into forms which will enable it to yield sufficiently under pressure.

Mechanical methods, moreover, concentrate operations. They consequently provide for rapid release of the materials of support, thus lowering the first cost of investment. So long as rooms took a year to drive and often stood for many months, to use steel props would have been extravagant beyond words. With longwall and long-face comes the possibility of moving the supports daily, or at least every few days, and more expensive material accordingly can be used. Intensification of operation has always aided progress in the use of steel for industrial purposes.

Another unexpected factor that will aid the introduction of steel is the fact that supervision has improved wherever concentrated mining has been introduced, and this has assured the regularity of setting and withdrawal of roof supports, which is so essential for their rapid, safe and certain recovery. Where such retrieval is uncertain, only inexpensive supports are to be favored.

Furthermore, as the working space needed for mechanical loading increases the need for the protection which steel jacks, props, crossbars and extension bars afford, steel is likely to win popular favor. Even forepoling may find successful advocacy. With the further use of steel, drawslate will be held in place rather than taken down and stowed. Roof coal will be retrieved wherever it is of sufficient fuel value. Corrugated steel bars and steel arches may be introduced, as in Scotland.

Mechanization already is well on its way; perhaps the steel-protected mine will be next in development. It is perchance too much to hope that some day with only a limited area of roof to support at any one time and with supporting members many times as strong as normal conditions would demand, the roof at the coal face will be made as insignificant a hazard as the steel factory roof.

The danger will be in removing any mat of crossbars and extension pieces after the need for some parts of them ceases to exist. The rock over a crossbar or extension piece may fall inopportunely when the support of one or two posts out of three has been removed. However, it is permissible at least to anticipate that wood will ultimately give way to steel as an inferior support to one that is superior and that increased safety and better working facilities will result.

Another step

ANNOUNCEMENT of the appointment of W. B. Wilson as arbitrator under the Illinois wage agreement must be accepted as further evidence that both parties to the contract in that state are genuinely determined to make the agreement there a workable instrument for the constructive development of sound industrial relations. The need for such development is imperative. Illinois is the last stronghold left the United Miners in the bituminous coal fields east of the Mississippi River. Politically, perhaps, the union might continue to dominate indefinitely, but unless the operators could live and prosper under that domination its principality would be an empty one.

Events of the past five years have taught the workers that idle mines fatten no union treasury. It was a hard lesson, but it seems to have been learned—in Illinois. A new spirit appears to be at work in that state. Old quarrels, ancient prejudices, hoary precedents are being submerged in an effort to re-establish the confidence in collective bargaining so badly weakened by past mistakes in policy.

"Dustless" coal

IN THE SEARCH for ways to make coal more pleasing to the domestic consumer the question of chemical treatment to render it "dustless" has been attracting increasing attention. Discussion of this question was the subject of one of the sessions of the last annual convention of the National Retail Coal Merchants' Association; it has found a place in the deliberations of some of the local organizations. Many retail distributors make the delivery of coal so treated a strong point in their merchandising campaigns. At least one large byproduct oven and a few bituminous operators also feature the fact that they ship "dustless" fuel.

That coal which will not fill the cellar and the upper floors with dust while it is being delivered or create dust when fired makes a strong appeal to the householder is patent. In the Chicago convention some difference of opinion as to the corrosive effects of the chemicals used arose, with those actually making deliveries refusing to take the corrosion factor seriously. What promises to be the most controversial point is whether the treatment should be at the mines or at the retail yards.

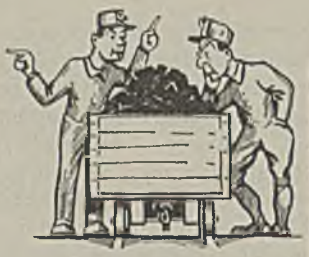
In its present state of development the "dustless" coal treatment is used as an aid to sales of individual operators and individual retailers. If the process is sound and the treatment can find wide application, however, "dustless" coal must soon cease to be an individual sales help and become an industrial sales weapon in the battle against other fuels. The logic of the situation offers no other conclusion. For that reason the producing end of the industry as a whole ought to make a thorough analysis of the problem.

Rewards for scholarship

FOR professional competence there are but two rewards, salary and reputation. There is general complaint that salaries are altogether too inadequate in any profession except in law and medicine to serve as incentives to young men. On the other hand, there are those who would feel themselves more than compensated with even a small salary if they could acquire thereby some such recognition of their abilities as is evidenced by men who enter the service of state or nation. Men are not wanting who would be content to earn only a fair living if they could therewith attain some degree of national acclaim and some opportunity to find a place among those notables who have contributed to the progress of industry and science.

What aid is given such graduates in technology by their employing companies? Little enough, it must be acknowledged. Many companies disapprove of their employees writing for the technical press. Engineers feel their duties, which are humdrum and none too well compensated, lead nowhere as far as distinction is concerned. If they make some notable contribution to the industry, no one is cognizant of it except their rivals in the company, whose interests naturally make them a little jealous and unappreciative. Were their achievements more generally recognized they would be encouraged to study their specialty and to intensify their mastery of its unsolved problems by close observation and painstaking record of what they observe.

Only by such thinking can professional competence be advanced, and surely companies greatly need to have such thinking applied to their problems. Some men, it is true, will think only for the purpose of making an immediate application to their daily duties. Men such as these often have executive minds. They rarely contribute anything profound. They have their uses, but a company with no minds but such as these will be most inadequately staffed. It needs men with a broader, deeper insight, and how will it get them unless it affords them an opportunity to attain some degree of reputation as a reward for their scholarship and application?



Putting Lid On Stray Juice

JIM and Mac had just crossed the track and started up the entry. Hearing a scramble and a thud, they both jerked around and got the shock of their lives—a sight of the Old Man stretched out in the middle of the track. By the time they reached him, however, he showed signs of taking an interest in life again.

"Are you hurt?" yelled Mac.

"No, nothing but my feelings," he retorted. "What hit me?"

"You forgot to duck when you went under the trolley wire," Mac replied.

"Oh! So that was it. Say, Mac, if I didn't know you better I'd fire you for not having a guard board up there. Men have to pass this way all the time, don't they?"

"Well now, chief, this place is marked up on the orders," Mac replied, "but I guess the boys haven't got to it yet."

"That's all right this time. But you and Jim come over here while I recuperate a little, and we'll talk things over. Now this is a good example of what can easily happen when electricity is not safeguarded, though it was not as serious as it might have been. Not only is there danger of contact with the trolley and other bare wires, as you both know; there also is the fire hazard. So the thing for you two to do is to fix this mine up so I can't kill myself in it no matter how hard I try."

HOW DO YOU DO IT?

1. *Where and how should guard boards or other protective devices be placed to prevent contact with trolley or bare wires?*
2. *What protective devices do you recommend?*
3. *How should open connections, plugs and sockets be protected?*
4. *What means do you employ to keep electricity from igniting doors, brattice cloth, timbers and coal?*
5. *When and how should switches to isolate sections be installed and how should they be operated?*

All foremen, superintendents, electrical and mechanical men are urged

Talk It Over

How Far Can System Go in Day Work?

Foreman Need Daily Costs

A GOOD FOREMAN should keep in mind at all times the amount of work to be done by his extra men—that is, the men who do the odd jobs not included in the regular routine. It is this odd-and-end work that lifts mine costs up to a high level unless it is closely watched. The foreman should always give his men a task that he knows will keep them busy through the shift. Much time is lost by handing out jobs piecemeal.

A good foreman does not carry a chip on his shoulder at all times nor does he attempt to fire every man he sees not following his every order to a T. Of course, he should fire men without hesitation when occasion demands. If he is the right man for the job he will teach and persuade his men to do what he wants done in exactly the time he sets for the work. It is quite important that he show an example of industry by being ready to lend a hand whenever necessary.

A foreman should be furnished with a daily cost sheet and any increase in cost should be called to his attention so that he may work toward its reduction. The only way to check up the daymen is to visit them often and at times when they do not expect a visit.

WALTER HORNSBY.

Stickney, W. Va.

Too Much Red Tape

I BELIEVE the system of controlling day work proposed by Mac and Jim should be worked out to suit the particular problems of every mine. Some semblance of system is being tried or is regular practice at quite a few mines. In some cases the system is highly successful and in others it has failed completely. Whether the cost of day work is high or low rests entirely on the shoulders of the mine foreman and his assistants.

I contend that a good foreman can handle his day work and boss his men to get efficiency without going through a lot of red tape. A reliable foreman knows what constitutes a good day's work and it is up to him to see that every man does his daily bit. If every Tom, Dick or Harry is allowed to make out reports of a day's work, Mac can rest assured that most of them will be padded to suit the particular occasion and that the reports therefore will have negative value.

Any superintendent that can pick a live-wire organization to take charge of the different departments of a coal plant need not develop gray hairs pondering over a lot of unnecessary daily reports. He has merely to analyze the several sections of his cost sheets and payroll to get the trends in cost and find out what men, if any, are slipping. The time consumed in going over reports would better be spent right out on the job seeing things first hand and talking with the various men in charge of operation. Daily reports should be a part of every operating system, but it should not be forgotten that too much red tape is as bad as no system at all.

Adrian, W. Va. C. T. GRIMM.

Scheduling in Disguise

STANDARDIZATION of equipment is one thing and scheduling of day work another. A mine is much different from a factory for a number of reasons. Underground there are many miles of openings, along which are scattered men who do the various jobs necessary for the getting of coal. These men are seen by the foreman only at intervals. A track man may be laying a switch at a certain point and be called from there to a distant point to help clean up a wreck. A timber crew may be called away at a moment's notice from a scheduled job to take care of a bad piece of roof a mile or so away.

Conditions are so variable that the laying of a switch, for instance, may take twice as long one place as at another. I doubt if Mac himself knows how long it will take to do certain jobs. In a switch job a rail may have to be cut and water may hamper the speed of the work. A wise boss may lay out enough work to keep his daymen busy, as he cannot schedule the work.

But there are other ways to improve the efficiency of the daymen besides attempting to schedule the jobs. Mac should make it clearly understood that when men fail to do the work for which they are paid, the company may not prosper and slack work may be the result. Where work is done by standard methods the time and materials necessary can be closely ascertained. Shifting of men should be so arranged that the distance between jobs will be a minimum. It is important that when a man or a crew arrives on the job the materials be already there. In every case the foreman should delegate some one man in the crew to act as the foreman.

Altoona, Ala. JOHN JONES.

Standards First; Schedules Last

SYSTEMATIZING and scheduling of company work is the big thing the foreman of today is up against. Coal is being mined and transported to the outside in a fairly systematic manner, but only because the operations are much the same for every cycle. There is a certain amount of work to be done in a given time and that work is being done more or less on schedule. The situation is quite different in the case of company work. One track man may be assigned the job of laying a new switch on new wood in a freshly made and clean place, free of water. Another may be given the job of relaying an old switch in a water hole. The time

Concentrated Experience

Are you missing an opportunity to fortify yourself with knowledge that may lead to a bigger job? Problems presented and discussed in these pages are based on experience which no one man gains by direct means in a lifetime. Many operating heads say they read these pages for ideas and knowledge that can be applied to changes in operating and management methods. The man who gets ahead is he who looks ahead and reads ahead.

To discuss these questions. Acceptable letters will be paid for

required for each of these two jobs will vary between wide limits and depend entirely on conditions. An inside boss cannot set a definite time on these jobs.

We all day-dream and read of the systems that are used at so-called model mines. But to my mind the big need of the day is controlled daymen. This means that men sent to do a job should be visited two or three times while the work is being done. They should not be met at the drift mouth at the end of the shift or on the following morning and confronted with the old, old question "Well, how did you get along on that job?"

Inside bosses should not be given more territory than they can cover. They should never stop for long chats with the men. They should have the men expecting them at all times and should never tag themselves by taking out a watch and informing the workers when they will be back to the job again. In attempting to cut down the time of doing a job be careful not to cut down on the quality of the work to be done. Every man should be made to understand that certain standards have been established and must be maintained.

Acme, W. Va. W. B. Otey.

Recent Patents

Coal - Washing Apparatus; 1,714,492. Francis H. Blatch, Hazleton, and Harry L. McLean and William C. Menzies, Scranton, Pa.; Messrs. Blatch and McLean assignors to Wilmot Engineering Corporation, Hazleton, Pa. May 28, 1929. Filed Dec. 6, 1927; serial No. 238,012.

Process and Apparatus for Treating Acidified Mine Water; 1,714,828. John T. Travers, Columbus, Ohio, assignor to Travers-Lewis Process Corporation, Columbus, Ohio. May 28, 1929. Filed July 9, 1928; serial No. 293,294.

Carbide Lamp; 1,714,912. James M. Jones, Manchester, Ky. May 28, 1929. Filed Oct. 6, 1825; serial No. 60,829.

Holder for Miners' Lamps; 1,715,148. George B. Simmons, Ottumwa, Iowa, assignor to American Mining Tool Co., Ottumwa, Iowa. May 28, 1929. Filed May 24, 1926; serial No. 111,110.

Loading Machine; 1,715,469. Norton A. Nedwick, Columbus, Ohio, assignor to Coloder Co., Columbus, Ohio. June 4, 1929. Filed Jan. 22, 1921; serial No. 439,092.

Self-Dumping Mine Cage; 1,716,030. John J. Collier, Irwin, Pa. June 4, 1929. Filed Jan. 21, 1925; serial No. 3,715.

Loader Truck; 1,716,170. Thomas C. Harvey, Columbia, Utah. June 4, 1929. Filed June 11, 1928; serial No. 284,598.

Skip-Loading Gate; 1,716,289. Andrews Allen, Glencoe, Ill., and Paul V. Lepley, Connellsville, Pa., executor for Daniel F. Lepley, deceased, assignors of one-half to Allen & Garcia, Chicago, and one-half to Connellsville Mfg. & Mine Supply Co., Connellsville, Pa. June 4, 1929. Filed May 13, 1927; serial No. 191,208.

Loading - Skip Operating Mechanism; 1,710,280. George E. Webb, Milwaukee, Wis., assignor to Koehring Co., Milwaukee, Wis. April 23, 1929. Filed March 15, 1926; serial No. 94,824.

Process and Apparatus for the Separation of Dry Materials; 1,710,521. H. M. Sutton, W. L. Steele and E. G. Steele, Dallas, Texas. April 23, 1929. Filed Jan. 19, 1922; serial No. 530,357.

Method and Apparatus for Carbonizing Coal; 1,713,840. Irving F. Laucks, Seattle, Wash., assignor to Old Ben Coal Corporation, Chicago, Ill. May 21, 1929. Filed June 23, 1920; series No. 391,243.

Apparatus for Burning Pulverized Fuel; 1,714,128. G. H. Kaemmerling, Allentown, Pa., assignor to Fuller Lehigh Co., Fullerton, Pa. May 21, 1929. Filed Aug. 19, 1925; serial No. 51,167.

Mining Transfer Car; 1,714,239. Ernest C. Pratt, Minneapolis, Minn. May 21, 1929. Filed March 20, 1926; serial No. 96,223.

The Factory-Like Mine Not an Impossible Goal

TO GET eight hours' work for eight hours' pay is the aim of every boss, but it appears the average boss gets little over 50 per cent out of at least 75 per cent of his men. It is common to see the man trip rushed to its destination and the men hustled helter-skelter to their several jobs by the foreman, only to be followed by the sight of idle men who wait because a certain job that should have been done was not done. A cure for all this is proper planning, close supervision and rigid discipline, all of which must be sponsored by the management, as the average foreman, for various reasons, is not able to put over this program alone. Section bosses should be the first ones on the job and the last ones to leave. Every man on the section should be seen two to four times each day.

System, scheduling and efficiency cannot be obtained unless the operation is conducted at a uniform rate. Uniform operation is gotten only by a system of daily cleanup in which a cut is taken from every place being worked every day. This plan insures a uniform amount of work for everybody, from the miner to the car-dropper under the tipple.

The old system of allowing a miner to come and go just about when he pleased, allowing him to make and follow his own plans has allowed men to shift promiscuously from one operation to another and has kept efficiency low. The modern mine plans every step in the work of every man. He is subjected to a discipline that has proved to be good business. The worker does well because the plan he is working under calls for a certain result which requires nothing more than average every-day efforts.

Men complain about the system at first but eventually they learn to like it because they do well under it. They and their families become contented and they seldom leave the mine, because it is well managed.

Paintsville, Ky. George Edwards.

Day Work Can Be Controlled Only to a Certain Extent

JIM'S idea of giving day men a specified amount of time for a certain job is practicable and will increase the work turned out by them. However, my experience with allotment of work to labor, by setting a time limit on the job, is that they will rush the job through too quickly and so neglect its quality, with the result that much of it may have to be done over again.

A system I have found to give good results is to allot to day men or day crews a certain section of the mine, the keeping up of which they are held directly responsible for. The territory is so assigned that these men as individuals or as crews have plenty of work to keep them busy. The work is outlined two to three weeks in advance and they are given daily instructions on the jobs to be tackled first.

When this method is followed the men never have any excuse for killing time and never really get caught up in their work. Furthermore, when the work is laid out in advance they can plan ahead and see to it that before a certain job is to be tackled the necessary materials are on hand for that job. For best results they should be informed or should inform themselves as to the progress and scheduling of coal extraction. It is a good idea to keep the men informed regarding the cost of materials and at the same time drill into them the importance of not wasting them.

Victor G. Gandy.

Hepzibah, W. Va.

Stick It Out, Mac

TIMBERING should be systematically done. In West Virginia during the last five years there have been two fatal accidents from falls of roof to every one from other causes, which goes to prove how important and necessary is systematic timbering. I

Trade Literature

Olson Self-Dumping Cage. Eagle Iron Works, Des Moines, Iowa. Pp. 16; illustrated. Describes the advantages of the OC-6 type over the OC-4 type. Automatic car stop and release mechanism are shown.

Roller-Smith Co., New York City, has issued Supplement No. 1-A to Bulletin No. 580, covering recent additions to the line of Type EAF small, inclosed, air-break circuit breakers.

Sullivan Machinery Co., Chicago, recently issued Bulletin No. 72-N, 16 pp., describing its Light Model Drill Steel Sharpener, Class "C". Pictures of the machine at work under many different conditions are included.

Rock Springs Loader Co., Rock Springs, Wyo., has issued the following: Bulletin 4, illustrating and describing the Universal Shaker Loader and Duckbill; Bulletin 5, The MacHatson Trough Fastener; Bulletin 6, General Description and Method of Operation of the Duckbill; Bulletin 7 includes list of repair parts of the Universal Shaker Loader and Duckbill.

M-S-A First-Aid Materials. Mine Safety Appliances Co., Pittsburgh, Pa. Catalog No. FA-1.; 30 pp.; illustrated. Covers everything used in first-aid work.

Nolan Automatic Safety Mine-Car Cagers. The Mining Safety Device Co., Bowerston, Ohio. Describes and illustrates the construction and operation of these cagers.

MetalayeR, for building metal surfaces or preventing corrosion, is illustrated and described in a bulletin recently issued by the Metals Coating Co. of America, Philadelphia, Pa.

General Electric Co., Schenectady, N. Y., has issued the following bulletins: Type Wd-200A Arc Welder, Continental Gas-Engine Driven; GEA-881B. Reciprocating Air-Compressor Sets, Single-Stage, Stationary; GEA-1119. Reciprocating Air-Compressor Sets, Single-Stage, Portable; GEA-1121. Travel Carriage for Automatic Arc Welders; GEA-994A. Reciprocating Air-Compressor Sets, Two-Stage, Stationary; GEA-1120.

Western Electric Mine Telephones and Accessories. Graybar Electric Co., New York City. Pp. 12, illustrating and describing the telephones designed and constructed to meet the particular requirements of various mine locations.

Type E Flexible Couplings. Westinghouse Electric & Manufacturing Co., Nuttall Works, Pittsburgh, Pa. Circular 1338; 8 pp., covering construction, instructions for alignment, with tables of capacities and dimensions and list prices for coupling parts.

believe in the five-spot method, which, if properly established, will catch slips or breaks in whatever direction they come. We set timbers 6 ft. apart and 6 ft. from the face in accordance with this method.

Timbering should not be left to the foreman. The assistant and the "super" should be consulted in arriving at the final system. They should go into the nature of the strata and consider local conditions. The mine foreman, of course, has the final say, but the fact always remains that three heads are better than one. Mac is not right; he ought to stick and fight it out. So long as he is convinced that his idea is right he ought to stay with it.

Elverton, W. Va. JOHN WEST.

Declares Practical Men Will Have Practical Ideas

IN timbering, as in all things, desired results can be produced only by system. Working places should be timbered according to a specified system and, no matter how good the roof may appear, omitting of timbers should not be allowed. Extra timbers should be placed where required. I would suggest a method allowing a certain number of square feet of roof surface for each prop. Distances between props parallel to the working face and at right angles thereto having been determined, a sketch of the working plan should be prepared and posted for the inspection of all concerned.

The fact that Mac said to Jim, "You held down my job once, and so did the Old Gent," is sufficient reason why Mac is wrong in threatening to quit his job. If the higher officials are practical men they will have practical ideas. If he can show them that his method of timbering has reduced the ultimate cost by accident reduction and lower maintenance charges, that procedure would be a more logical argument for the continuation of the system than his threat to quit.

Cape Breton, N. S. ROBERT GIBSON.

Stick to Your Post

NO! Timbering should not be left to the judgment of the foreman. The miner, if he is a safe man, can tell the foreman much as to how timbers should be set since he is a witness to roof action day after day. A timber should be omitted only when its presence is a greater danger than its absence.

As to Mac's threat to quit, such action may be all right if it brings results; but he would do better to hold his post. Good moral courage demands that he stay on the job for the good of all concerned. In the end the matter will be straightened out to the satisfaction of everybody. Perhaps the Old Gent has no conscience. He may be one of those operators who are willing to take chances and get by. Safety must in some way be forced on those who have no conscience. W. H. LUXTON.

Linton, Ind.

On the ENGINEER'S BOOK SHELF

Practical Hints on Colliery Power Plant, by Robert Rogerson; 222 pp.; 5½x8¾ in.; Charles Griffin & Co., Ltd., 42 Drury Lane, W.C.2, London, England; price $5.

To American engineers the title of Mr. Rogerson's book is misleading because over half of the book is devoted to the distribution and utilization of electricity in coal mines. Treatment of the power plant proper is confined to four chapters: Generation of Steam, Distribution of Steam, Utilization of Steam, and Generation of Electricity. The sub-title, "A Practical Handbook for Colliery Managers, Colliery Mechanical and Electrical Engineers, and All Interested in Selection, Installation, and Operation of Power Plant in Mining and Other Work," is comprehensive except for the fact that the same treatment is accorded to electric motors, power wiring, signal systems and mine telephones.

Highly technical terms and formulas are skillfully avoided, thus making the book valuable as a reference for the practical electrician and for the manager or mining engineer who does not care to delve into electrical theory. Apparently the treatise is an accurate guide to the best practices at coal mines of the British Isles. The author, who is colliery manager, Mount Vernon Collieries, Glasgow, was the 1927-28 gold medallist of the Association of Mining Electrical Engineers.

* * *

The Pyrolysis of Carbon Compounds, by Charles Dewitt Hurd, associate professor of chemistry, Northwestern University. Evanston, Ill.; 807 pp.; 6x9¼ in.; the Chemical Catalog Co., New York City; price $12.50.

Another unit of the American Chemical Society's series of scientific and technologic monographs is this book on the pyrolysis of carbon compounds. Large as it is it has a strictly limited field. First, it belongs in the category of books on chemical science and not on chemical engineering; second, it has to do with unaided loosening of carbon compounds by heat without reference to catalysis and, third, it does not treat at any great length of those most important aggregates of carbon compounds —coal, oil and rubber.

Brought out by such editors and under such auspices it is needless to say the book is authoritative. After a short chapter defining pyrolysis the author has a valuable chapter on "Generalizations" in which he designates six rules which seem to govern pyrolytic dissociations. Of course, there may be and perhaps should be others, but these indicate some of the lines such pyrolysis may follow. Other generalizations on the scission of hydrocarbons and on the electron attraction of radicals and its relation to pyrolysis follow on the pages succeeding. "Carbohydrates, Wood and Coal" occupy twenty pages. For the most the information is regarding definite laboratory compounds of carbon and hydrogen and not regarding the mixtures of such compounds as found in nature. It is a book for organic chemists rather than for mining men or even chemical industrialists.

* * *

Proceedings of the Second International Conference on Bituminous Coal; 2 vol., 987 and 940 pp., respectively; 6x9¼ in.; Carnegie Institute of Technology, Pittsburgh, Pa.; price $15.

A big contribution to industry are the International Conferences on Bituminous Coal which the energy and genius of Thomas S. Baker have created. One senses their value when one sees the two large and meaty volumes of the report of the second conference. Low-temperature distillation has had to travel a long and weary road. It has gone a long way already, and yet, unfortunately, it is still some distance from any goal, but these conferences bring it measurably forward and are resting places on the road where the technique of the development can recuperate for further progress.

And, of course, there is much in these volumes besides low-temperature distillation; much that has a broader application, like catalysis; much that refers to entirely different lines of endeavor, such as the powered-coal engine, gas making and the classification of coal. It is to be hoped that the conferences will be continued, for it takes many blows to drive a nail to its final clinching. To hear some persons talk one would think that a single conference would serve finally to settle the many problems relating to coal utilization and make other conferences unnecessary.

Particular attention might be drawn to the last three papers in the second volume, which would seem to show that perhaps we have been hasty in assuming that only gasoline and benzine or similar liquid fuel should be used for motor trucks and cars. The French are looking to combustible gas either carried in flasks or generated on the tractor. In a 379-mile race a truck burning unbroken lignite briquets consumed fuel worth only 21 per cent as much as its nearest competitor, which used acetylene and heavy oil, and only 15 per cent as much as the next competitor, burning heavy oil, thus receiving the prize of the III Rallye des Carburants Nationaux.

NOTES

From Across the Sea

SOME of the thickest deposits of coal are to be found in the more recent geological measures. Many of the lignites of Germany and Australia and even of the western portion of the United States are of immense thickness. As most of them lie quite level and have thin and easily removable cover, they afford exceptionally favorable opportunities for stripping.

The brown coals of the State of Victoria, in southwestern Australia, of which little has been published, are probably of Miocene age, a period when camels, mastodons, three-toed horses, tapirs, rhinoceroses, elephants, members of the wolf, fox, cat, weasel and other families were to be found. During this period even apes appeared and, in some parts of the world, redwood trees probably abounded. One must not assume, of course, that these animals and trees were found in the area now occupied by the lignite fields of Victoria. They are mentioned solely to impress on the reader the relatively recent character of these lignite deposits.

The illustration showing a map of parts of Victoria around Melbourne includes all the brown coal areas in the state. Perhaps it might be permissible to list their approximate reserves, as stated by H. Herman in a paper on the "Utilization of Brown Coal in Victoria," delivered at the recent Second Empire Mining & Metallurgical Congress in Montreal, Canada, from which and from "Power and Heat," published by the State Electricity Commission of Victoria, most of the facts about to be presented have been taken.

The total approximate reserves are

Brown Coal Areas in State of Victoria, Australia

Name of Area	Approximate Reserve in Millions of Tons	Name of Area	Approximate Reserve in Millions of Tons
Wensleydale	3	Yallourn, Morwell, Traralgon-Sale	27,000
Bambra	1		
Lal-Lal	60		
Rowsley-Altona	7,500	Welshpool	2,250
Yarragon	300		
Moe	75	Total	37,189

37,189,000,000 tons, as the table shows. This is about equivalent to the combined coal tonnage estimated as existing in Iowa and Michigan prior to the opening of coal mines, though the coal of those states was of higher rank and therefore contained more heat units. The calorific value of the Yallourn coal runs between 3,090 and 5,010 B.t.u., which is about a third or a quarter as much as the best kind of coal.

The biggest deposit in Victoria is in the Latrobe Valley. It covers about 800 square miles, an area about 60 per cent larger than that of the anthracite coal fields of Pennsylvania. It contains about 42 per cent more coal. This Latrobe Valley deposit is represented in the table under its three divisions: Yallourn, Morwell and Traralgon-Sale. The thickness of the coal can be judged by the fact that a borehole, 1,000 ft. deep, passed through 808 ft. of coal, the principal part of which was in three big beds 266, 227 and 166 ft. thick respectively. Practically all this coal can be mined by open cut.

The area at Yallourn which is under the control of the State Electricity Commission covers 20 square miles, in which it has been computed there are six billion tons of coal of an average thickness of 200 ft. lying beneath an average overburden of 50 ft. Where in America we may move as much as 15 ft. of easy-digging cover, or 7 ft. of hard overburden for every foot of coal, in Yallourn there will be 4 ft. of coal for every foot of overburden.

Thus compared with our most adverse conditions for easy digging, Yallourn has an advantage of sixty to one. Of course, the Yallourn coal is of a lower heat value and has to be drained by mining and by exposure to evaporation, but despite that fact it is clear that the State of Victoria has a bonanza in these big beds, especially in that part of them being operated at Yallourn for the generation of power.

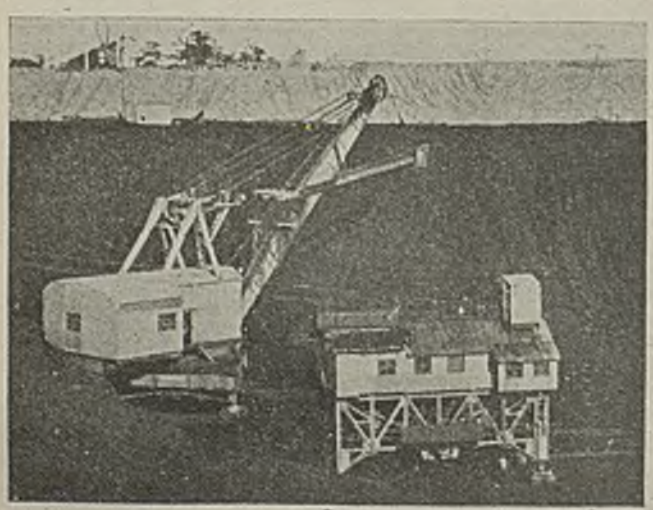
The coal contains large tree trunks, several feet in circumference and up to 20 and 30 ft. long. Much of the wood in these trunks can be split and bent as if it were still living. About half the deposit consists of partly altered plant remains. The rest is composed chiefly of what appears to be decayed hydrocarbonaceous mud with much resinous matter.

Before being opened up the lignite had about 66.5 per cent of moisture —that is, about two-thirds was water— but already the moisture has been diminished 3 per cent by evaporation, and it is expected that when the coal is well developed the moisture content will be reduced to 60 per cent. The lignites of the United States range up to 36 per cent water, but the celebrated Lausitz high-moisture coals in the southeast of Germany and those of the Rhineland run about like those in Australia.

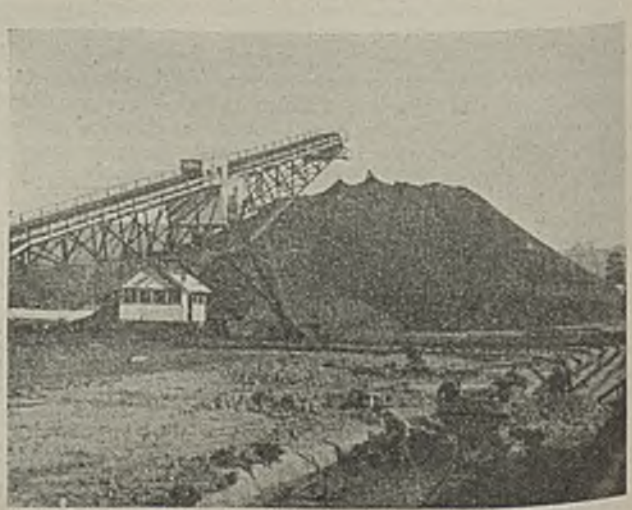
In order to drain the coal 11,000 ft. of airways have been driven from two shafts sunk through the coal seam. These airways will drain an area 600 x 2,000 ft., removing water from the coal above and preventing water from below from rising up into the coal above it. With the new methods efforts will be made to expose as much of the coal at its top and at the first lift as possible before mining it.

At this plant the overburden was not and is not now to be dumped at a point remote from the coal area. Apparently

Ten-Yard Shovel Delivers Coal to Traveling Preparation Plant



Stacker Piles Up Overburden to Height of Sixty Feet



the distance appears to be prohibitive. The cover is well within casting limits. In fact at the Yallourn pit it is only 33 ft. thick. The coal, however, is so thick—180 ft. in that pit—that it exceeds the convenient single-lift range of the largest shovel. Even if a single shovel took the whole 180 ft. there would have to be lifts in shooting. Consequenty, transportation stripping seemed essential. The cover was originally removed by two rather small stripping shovels, one with a 3½-cu.yd. capacity bucket and another with a bucket of 2½-cu.yd. capacity.

A belt conveyor 4 ft. wide of 8-ply canvas with 3/8-in. and ⅛-in. rubber on the working and on the pulley side, respectively, was used for transportation of the material to the dumps. Because the cover as lifted by the shovels was delivered intermittently and in large masses wholly unsuited for transference by the belt conveyor, "feeders" which followed the shovel were installed to take the discharge, reduce it to a suitable size for the belts and feed it to them in a uniform stream.

Two types of feeder were used. One was for material that needed a reduction in size. This had a pair of rolls set 6 in. apart. After the material had passed through these rolls it was allowed to go to the belt conveyor. Some material contained clay and was sticky. For this a feeder was provided consisting of a circular pan with a revolving bottom from which the material was plowed onto the rolls and thence delivered direct to the main belts.

The conveyor took the spoil 600 ft. to a radial "stacker" which may be described as an inclined conveyor resting at one end on the ground and on its center on a large carriage which itself travels on a radial track of easy curvature. The end of the conveyor projects well beyond this track, so that the coal can be discharged free of the track from different points near the end. This stacker lifts the material to a level 60 ft. above the plain, so that the discharged spoil will cover as small a part of the area of the coal field as possible. The spoil dump has a normal width on the ground of 435 ft. and is made 255 ft. wide at the crest.

Later the stacker was removed to a point a half mile from the overburden face and then the belt conveyor leading to the stacker was abandoned. An electrically driven dragline excavator of about 600-cu.yd. capacity per 8-hour shift replaced the shovels, and side-tipping cars transported the overburden to the stacker, steam locomotives furnishing the tractive effort.

A large British 10-yd. shovel electrically operated was used to excavate the coal. It has a radius of action of 98 ft. and a capacity of 2,500 cu.yd. per 8-hour shift. This shovel in the day of its construction compared well in size with the best in the United States, but today there are several having larger excavating buckets, a bigger radius of action and a greater digging capacity.

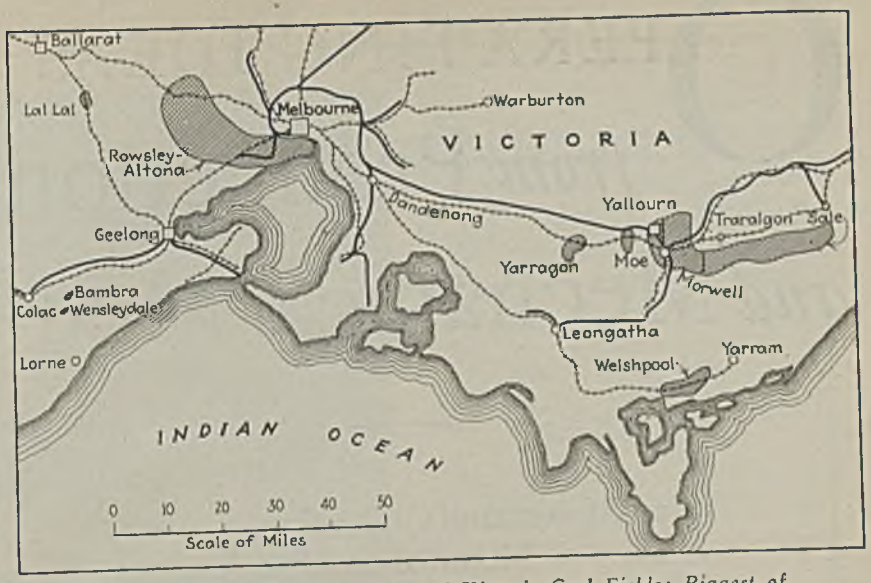
In the United States the big shovel always is the one that handles the overburden. The coal shovel is by comparison a pygmy piece of equipment. But at Yallourn it was the giant shovel that tackled the coal face because the larger yardage was of coal and not of cover. However, large as it was, it took only about 70 of the 180 ft. of coal—much less than half. It dug 3,000 to 3,500 tons of coal in two 8-hour shifts.

It also had its satellite, a traveling, crushing, weighing and loading plant running on wheels, that delivered coal to the trucks of an endless ropeway which, leaving the open cut, rose on a 7½-per cent grade to the screening house and its receiving hoppers. All the coal under 2½-in. diameter was delivered to the power station and the oversize and crushed coal unscreened went to the briquet plant.

Today the State Electricity Commission has gone over bodily to German methods. The Maschinenfabrik Buckau Aktiengesellschaft is installing a bucket dry-land dredger for the removal of the cover into 20-cu.yd. bottom-dump cars which will be transported on the level by electric locomotives, each trip comprising six cars. A rail-shifting machine will move the tracks for this dredger.

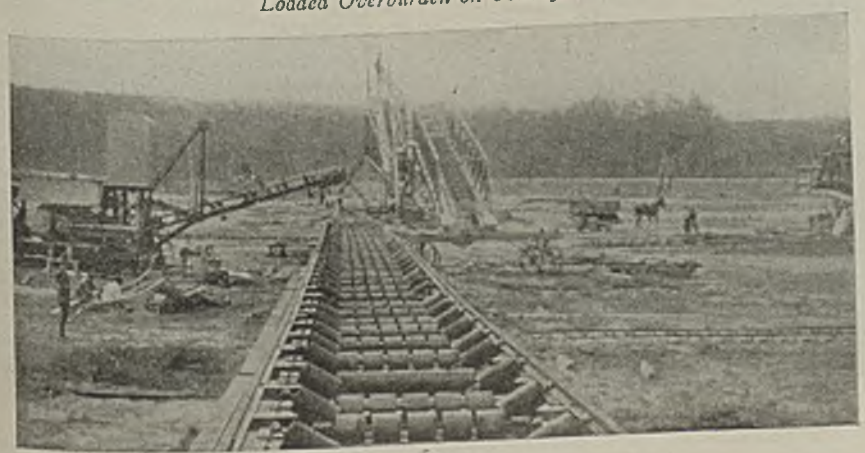
A scraper dredger will drag *down* and load the layer of coal above a level track situated 100 ft. above the base of the bed, dropping it into a bin that travels with the dredger. Thence it will be loaded by gravity into 20-ton bottom-dump cars. The remaining 100 ft. of coal will be taken by a deep coal dredger traveling on the same level. This will drag the coal *up* to the operating level, where it will be discharged into a hopper, where again, as with the other dredger, it will be dropped into 20-ton bottom-dump cars.

The trips with their electric locomotives will be hauled by a balanced engine plant up a steep grade of 16⅔ per cent leading up out of the strip pit. They will not only take the cars to the incline but follow them up the slope ready to haul them at the upper level to the dumping point. As the descending empty trips help to pull up the loads the actual energy consumed in pulling the trip up the hill is not large. The unprofitable or dead load exactly balances on every trip.



Hatched Areas Show Locations of Victoria Coal Fields; Biggest of All Only 110 Miles from Melbourne

Conveyor Under Construction With Stacker in Rear; at First Shovels Loaded Overburden on Conveyor



R Dawson Hall

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

Fan Motors and Clutches Mounted on Unit Base

TO GUARD against a long interruption of ventilation in case of a motor failure and to provide a means of increasing the fan speed as the mine is developed, a unique arrangement was selected for the fan drive at mine No. 22, a new operation of the Island Creek Coal Co., in Logan County, West Virginia. The driving-unit parts, consisting of two motors and a countershaft with two multiple-disk clutches, are mounted upon a large cast-iron base which in turn is mounted on slide rails to provide belt center adjustment for the fan pulley belt.

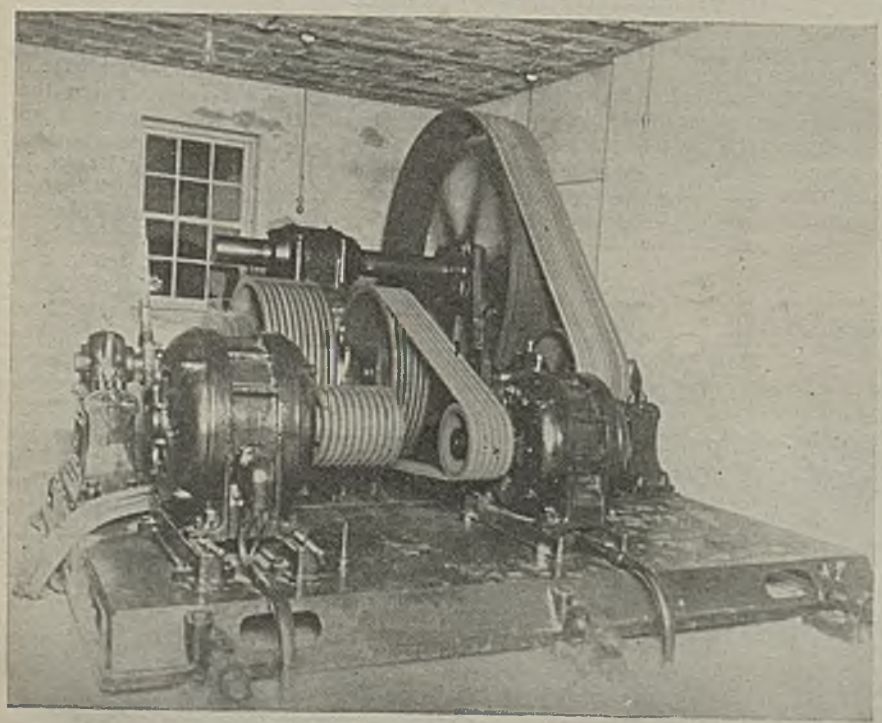
Squirrel-cage rather than slip-ring induction motors are used because of their simplicity, greater reliability and lower cost. The same advantages apply to the motor starters. Because this type of motor is not applicable to variable speed duty it was necessary to provide pulley ratio changes to accommodate the increases of fan speed, as more air is required.

One motor is rated 40 hp. 575 r.p.m. and the other 75 hp. 865 r.p.m. The pulley ratio of the first gives a fan speed of 51 r.p.m. and that of the second a speed of 102 r.p.m. By substitution of a larger motor pulley the 40-hp. motor can be made to drive the fan at 76 r.p.m. and likewise the 75-hp. motor can be made to drive it at 127 r.p.m. By the one substitution of the two motor pulleys the arrangement will therefore provide four fan speeds, namely, 51, 76, 102 and 127 r.p.m. Intermediate speeds would require the purchase of pulleys of intermediate sizes.

The cast-iron base, which is 8 ft. 9 in. by 12 ft. 2 in., is mounted on three slide rails. Thus the whole driving unit is made movable for adjusting the tightness of the main belt, which rides on the 96-in. fan pulley. The base with its clutch-fitted countershaft was designed and made especially for the job by the Allis-Chalmers Co., the maker of the Texrope drives with which the unit is fitted.

When the accompanying photograph was made the 40-hp. motor was doing the driving and the endless belts of the 75-hp. motor were lying on the base in readiness for application. Perhaps when the mine has been further developed the belts of both motors will be kept in operating position so that a shift of drive from one motor to the other can be made by operation of the two clutches. Keeping one set of belts off obviates the necessity for regular lubrication of the respective loose pulley on the countershaft.

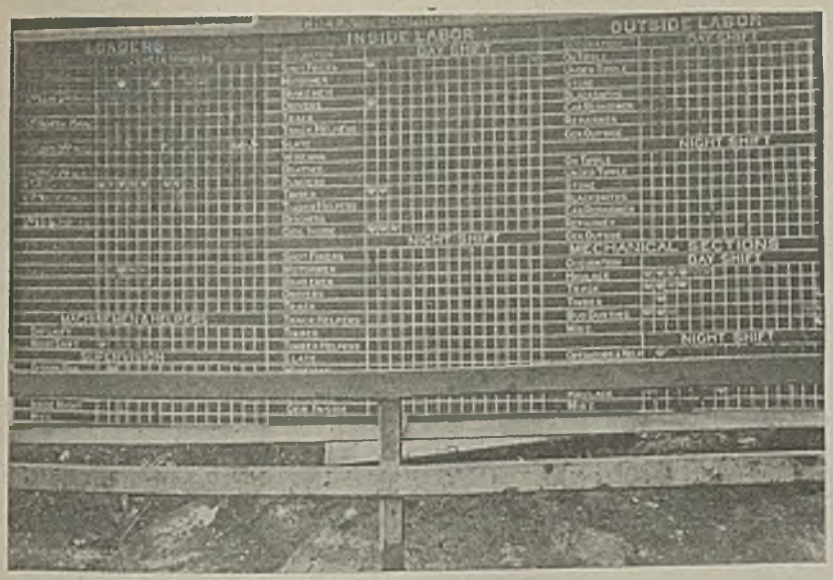
Adequate Provision for Tightening Each Belt



Check-In Board Indicates Division of Labor

Check numbers no longer mean "just another man" in the eyes of modern mine management, as in the old days. Today a check number represents a man of individual traits and character and it also represents a job or some part thereof. In order that check numbers may tell a complete story of the mine personnel and job classification from day to day, some method must be provided for grouping the checks on the check-in board at the mine opening.

At the No. 206 mine of the Consolidation Coal Co., in the Elkhorn division of Kentucky, a check-in board is provided which lists practically every underground and surface job at that mine. A study of the board will give the superintendent whatever information he may want as to the distribution and division of labor. The merit of the method is that it provides quickly



A Record of Jobs and Men

and without additional effort a picture of the organization each day. The picture is complete when the last man to check in places his check on the board. When corrected by the mine foremen for any changes in the assignment of certain men to jobs, it provides an accurate record for the timekeeper.

Roof Coal Kept Tight By Timber Set

In the Montour No. 10 mine of the Pittsburgh Coal Co., Library, Pa., when roof coal is left in a room, a timber set sometimes is placed across the mouth of the chamber. Where the roof is poor and tends to come down immediately or soon after the coal is taken from a room

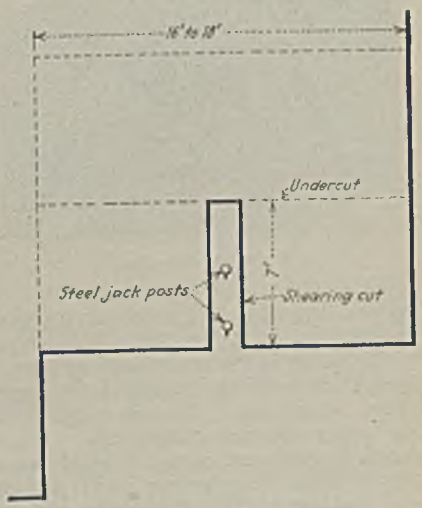
Where a Timber Set Is Needed

or entry, the leaving of a foot or so of coal usually is highly beneficial in overcoming the trouble. However, unless the lip which is formed at the point where the leaving of top coal begins is not properly supported, the top coal is likely to spring away from the roof, causing air to reach the roof measures above the coal. In that case the top coal may lose its effectiveness.

Steel Jack Posts in Shearing Cuts

The possibility of using steel roof supports underground is receiving a good deal of attention nowadays. One of the most immediate opportunities of utilizing this comparatively new tool is for holding fragile roof in conjunction with shearing of the coal face by machine. In addition to the desire to get more lump coal shearing also is practiced to avoid the shattering of tender roof.

If, then, after a shearing cut has been made and cleaned out, one or two supports are placed within the sheared channel before the coal is shot, there is a decided possibility that the roof strata, which otherwise would come down, will remain in place while the coal is being loaded out. The adjustable steel prop, which is dependent on a rack mechanism for raising or lowering, or some similar type, is ideally suited for the purpose.



Posting Before Shooting

It requires little side clearance and can be set securely, from without, in the narrow quarters of the shearing cut. The method here described is practiced in several mines of one of the largest producers, where the block system of mining is followed.

Give and Take

A man who closely follows these pages of operating ideas from month to month will avoid much wasted effort in his everyday job. The problem he faces is simultaneously being encountered by his neighbor or an operating man in some distant field. Somewhere, someone has solved that problem. The solution of that problem and many others may be found in these pages. However, as a man won't want to take all and give nothing, those who borrow from these pages can likewise contribute to them. Certainly you have solved some operating problem by a mechanical or an electrical trick fresh from your brain. Send in your ideas and *Coal Age* will pay $5 or more for each of those accepted. A photograph or sketch should accompany each idea.

Fire Protection in Mining Town

At Elkhorn, W. Va., the camp of the Crozer Coal & Coke Co., every fifth house is provided with a hand-size extinguisher. All parts of the town are accessible from a water system consisting of 6-in. mains from a 190,000-gallon tank which stands at an elevation of 200 ft. above the town. The fire-fighting facilities also include a chemical engine.

Pneumatic Trip Stop Grips Car Wheels

A positive and quick-acting pneumatic car retarder and stop is installed at the load end of the rotary dump at the No. 35 mine of the Berwind-White Coal Mining Co., Windber, Pa. The design of this device is the handiwork of the engineering department of the company. It consists merely of two heavy and reinforced angle irons which are so actuated as to grip the car wheels

A Quick Car Stop

by pressing them against elevated wheel guides.

As shown in the accompanying photograph, the gripping motion of the angle irons is imparted through toggles on the upper end of vertical shafts. These vertical shafts are carried in steel sleepers to which the elevated wheel guides are anchored. To the lower end of these shafts are keyed stiff arms which are connected to the plunger of an air cylinder. When the plunger moves in or out, it causes the vertical shafts to turn, thus operating the toggles to tighten or release the angle-iron wheel grips.

A Bit of Psychology in Mine-Plant Design

If a water fountain is to be installed near the mine opening for the use of underground workers, why not place it in the shadows of the shelter housing the bulletin boards? A fountain was thus located at the Nemacolin mine of the Buckeye Coal Co., Nemacolin, Pa. The object of thus placing the fountain and of locating seats under the shelter is to attract men to that spot in the hope that they will give some attention to the announcements or records posted on the board.

Fountain Attracts Attention to Bulletin Board

Averts Stops and Starts on Grade With Low-Voltage Signal System

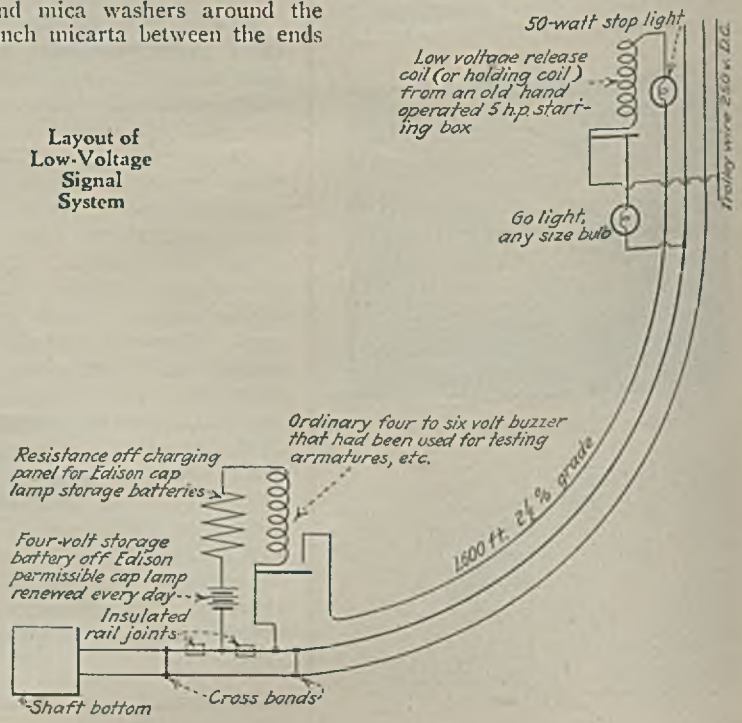
ON one approach to the main bottom of the No. 2 mine of the Bell & Zoller Coal & Mining Co., there is a 90-deg. curve on a 2½-per cent grade. Frequently, the track to the shaft bottom became congested with loaded cars so that whenever a loaded trip approached the bottom before a sufficient number of cars had been hoisted, it was necessary to stop on the grade. Since it is inefficient and uneconomical to start a loaded trip on a grade, says Dale Carter, chief electrician, Mine No. 2, Bell & Zoller Coal & Mining Co., in the *O-B Bulletin*, it was found desirable to install an automatic signal system so that if there happened to be a delay at the bottom, the approaching trip could be stopped before it hit the grade.

After several unsatisfactory attempts had been made to purchase a signal system to meet the specific requirements, it became evident the coal company would have to build one. Experiments with various types were conducted for almost a year, when, contrary to the advice of several experts, it was decided to try a low-voltage insulated rail system.

The accompanying drawing shows the layout of the apparatus which we are using. The near end of the signal block was set far enough away from the shaft to give a cushion or reservoir of sufficient cars to keep the hoist operating, and at the same time to be in the clear of the signal block. This also permits a loaded trip to come up the grade to the shaft bottom without unnecessary delay. At this point a rail was insulated with ordinary mica tubing and mica washers around the bolts, ⅜ inch micarta between the ends of the rail and fiber paper under the angle bars. The rail was on dry ties so that no other insulation was necessary. Two cross bonds were installed just outside of the insulated rail. A standard Edison cap lamp storage battery and an old buzzer that had been used to test armatures, etc., were connected in series from the insulated joint to the rail. A contact was made on to the armature of the buzzer, so that when it was energized by the insulated rail being shorted to the track by the wheels of a car, a circuit was completed between the rail, 1,600 ft. of No. 12 copper wire and a 50-watt "stop" light through a small relay to the 250-volt trolley wire. For the particular characteristics of the trolley circuit it was found necessary to use a 50-watt bulb in the "stop" sign.

The relay at the signal end of the system was the holding coil of an old 5-hp. hand-operated starting box. When this coil was energized the armature was pulled up, opening the "go" light circuit. This circuit was between the trolley wire and the rail through the armature of an old starting-box coil. To insure successful operation the Edison battery is renewed daily.

Because when installed the system as described was merely an experiment, old and used parts of equipment were used to cut down the investment. However, the apparatus is working so well that the old parts are still in use. From November, 1927, to date, this signal system has caused no trouble and continues to operate perfectly.



Layout of Low-Voltage Signal System

Repair Shop Built to Suit Maintenance Man

No provision for a bridge crane, lack of height and no special regard for keeping out the heat of the sun in summer or keeping in the heat of the stove or radiator in winter, are common faults of the outside repair shops at drift mines of average size. Too often the shop is a low building with a steel covering without heat insulation. These common faults were recognized by the Harlan Fuel Co. when it planned a new shop at the Yancy mine, in Harlan County, Kentucky.

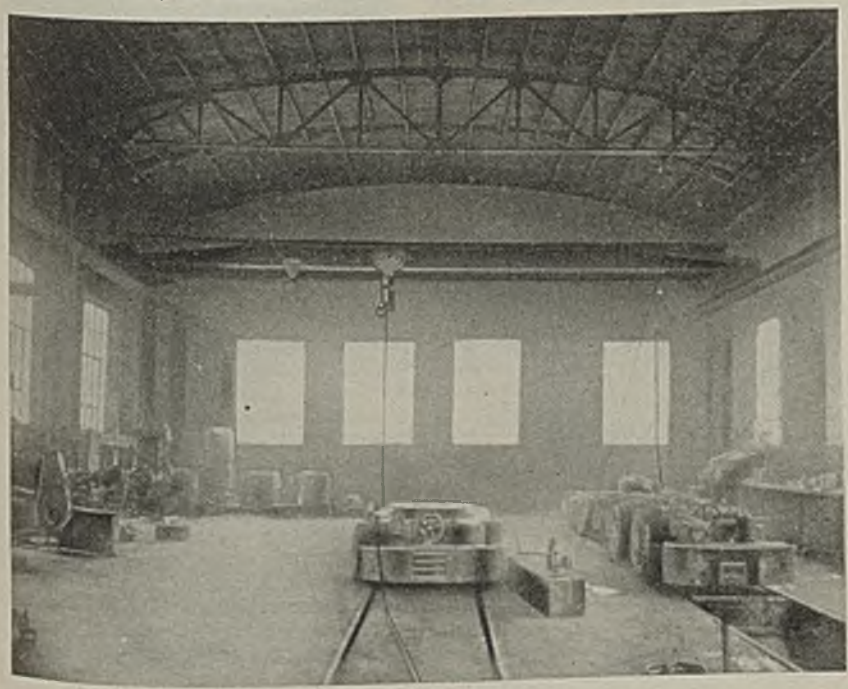
The building is 40x70 ft. and is 20 ft. high at the plates. Excepting the steel trusses of standard bowstring design which support the curved roof, the building is framed with wood. Both roof and sides are solidly covered with 1-in. wood sheeting. Felt roofing is used on top and corrugated galvanized sheet on the sides.

A maximum clearance of 10½ ft. to the hook of a 5-ton chain block is provided by the crane rail being 15 ft. from the floor. The crane beam is equipped also with a 2-ton chain block with its own trolley. It was the plan to provide a chain gear for moving the crane, but this was omitted when it was found that, if necessary, one man can pull it, and two men can pull it easily.

There is a track in the center of the room and another with a repair pit at one side. The machine tools are arranged along the opposite wall. This equipment, all new and having individual motor drives, is as follows: 100-ton wheel press, power hacksaw, 14-in. drill, double-wheel emery grinder, 20-in. shaper and 18-in. lathe.

Building, equipment, and general arrangement are all such as should stimulate the pride of the man in charge of equipment maintenance. A working condition of this character attracts competent men and goes a long way toward eliminating expensive "lick and a promise" repairing.

Protection From Heat and Cold and Plenty of Headroom

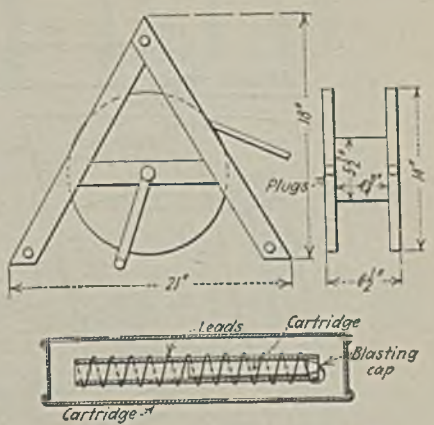


Makes Shooting Sure, Frugal and Safe

At the Union Pacific Coal Co.'s mines the shooting cable is kept rolled on a reel except when the shots are being fired. Thus all kinking is avoided and the cable is kept in better condition and lasts longer than when it looped and tied. Tirex shooting cable is used. The reel is mounted on an "A" frame 18 in. high and with a spread of 21 in. The terminals are metallically connected through the center of the drum and through the flanges on either side to two plugs, one in either rim. When the cable is played out the two terminals of the shooting battery are each connected with the plugs so that a current can be established by plugging the handle of the battery, thus operating the magneto.

Lest someone should tamper with the battery and so fire the shots prematurely a man is kept at the battery end from the time the wires are played out. The fuses are purchased each nested in its own paper cartridge, around which the connecting wires are wound. This cartridge is nested in another of indurated paper with suitable indurated paper ends.

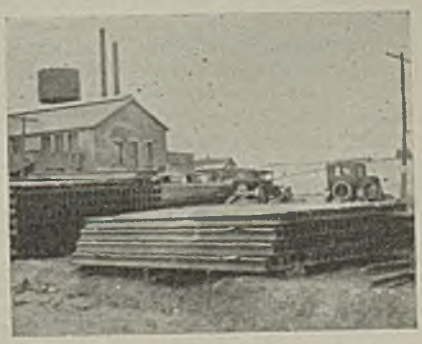
The methods here detailed were described more generally and without illustration by D. C. Foote in a paper read before the Rocky Mountain Coal Mining Institute in March, an abstract of which appeared in *Coal Age*, pp. 216, 218-219.



Above—Reel for Shooting Cable
Below—Paper Container for Fuses

Paint Saves the Rails While in Storage

If track rails are left exposed to the elements for any length of time before being used they will be reduced in section through rusting. To combat this tendency to rust, the Valier Coal

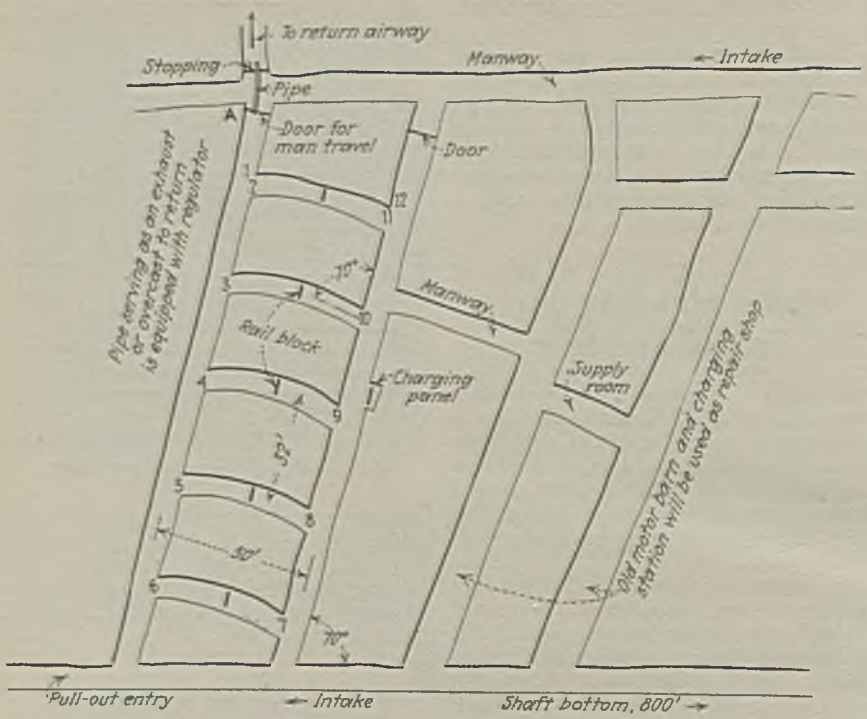


Saving the Surface Saves All

Co., Valier, Ill., applies a coat of paint to the rails before storing them. The paint may be applied by dipping, by brush or by spray, depending upon the number of rails to be treated.

Ample Ventilation in This Motor Barn

Adequate ventilation and easy access were the main considerations in the layout of a barn for the storing and charging of storage-battery gathering locomotives in the Indianola mine of the Inland Collieries Co., Indianola, Pa. This barn is about 800 ft. from the shaft bottom and adjacent to passages which formerly were used for a like



Storage-Battery Barn Layout in Indianola Mine

purpose but which now have been converted into a machine shop.

By reference to the accompanying drawing it will be noted that the new barn differs from the old one mainly in that an individual stall is provided for each locomotive. Each stall opening between the two barn entries accommodates two locomotives and a barrier rail is placed in the middle of the stall opening in order that no locomotive can leave through the end opposite the one through which it entered and in consequence be turned end for end. The stall openings are curved so as to avoid sharp turns. All interior surfaces have been gunited.

In addition to the storage space for two locomotives in the stall openings, the dead end of each of the two barn entries will take care of one locomotive. Gases generated in the battery-charging operation are conducted directly to the return by an overcast or exhaust pipe, equipped with a regulator, as shown at *A* in the drawing.

Gives Time-Study Data

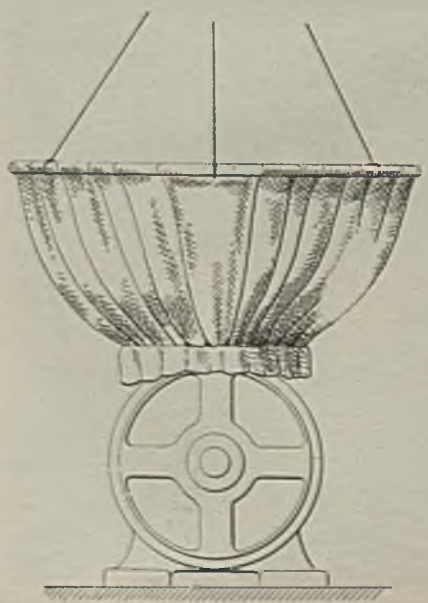
The placing of a small, portable type of recording voltmeter at or near loading machines for ascertaining electrical data which can be used for improving machine operation, is suggested by F. E. Gleason, general master mechanic of the United States Fuel Co., Utah. He states that such an instrument also furnishes information sufficiently accurate and comprehensive to form the basis of time studies.

Dust Cap Protects Motor When Not in Use

Operation of an open-type motor in a small box built over it to keep out dirt is almost certain to cause injurious heating of the windings unless the load is very light. On equipment which is not used regularly it may be practical to arrange a dust cover which can easily be raised or removed during actual use of the motor.

A direct-current motor mounted on a lathe in the repair shop of the Crozer Coal & Coke Co., Elkhorn, W. Va., is equipped with a removable cover of a unique pattern. This is in the form of a circular hood, like a stocking cap, which has the small end attached to the top of the motor. The fabric is non-inflammable brattice cloth. The hood is lowered and raised by means of a rope attached to an iron ring which forms the large end of the cap. The rope passes through a pulley overhead and then down to a hook located at convenient height on the wall. When the cap is raised it turns inside out.

Motor in Use and Hood Raised Out of the Way



This Shoulder Strap Makes Extinguisher Mobile

In the case of the hand type of extinguisher for fighting underground fires some means should be provided to enable a man to carry it with the greatest facility and dispatch to the seat of a fire. In the New Orient mine of the Chicago, Wilmington & Franklin Coal Co., Illinois, each hand extinguisher, 5 gal. tank capacity, is provided with a pair of slings, formed by one fabric strap, which fit over the shoulders and under the arms. This arrangement allows a man to carry the extinguisher on his back with comfort while traveling at a trot. The strap is anchored to two hook lugs at the bottom of the tank and threaded through two other lugs near the top of the tank in such a manner that the slings are equalized as between the shoulders of the man carrying the tank.

Makes for Greater Speed In Fighting Fires

WORD *from the* FIELD

Coal Operators and Buyers To Arbitrate Disputes

Between five and six million dollars of the nation's buying power may soon sumbit its commercial controversies to arbitration under the rules of the American Arbitration Association, according to a joint statement by Lucius R. Eastman, president, and G. A. Renard, secretary-treasurer, National Association of Purchasing Agents. The announcement culminates extended negotiations toward establishing effective arbitration machinery.

The first known practical joint arbitration agreement between trade and professional bodies was recently entered into by the National Coal Association and the purchasing agents' group, using the clause of the arbitration association. This clause specifies that "any controversy or claim arising out of or relating to this contract, or for the breach thereof, shall be settled by arbitration, and judgment may be entered on the award in any court having jurisdiction." This provision affects all contracts made between the members of the coal body and the 5,000 members of the purchasing group, Mr. Renard stated.

Anthracite Companies To Merge

The Jeddo-Highland Coal Co., Jeddo, Pa.; Hazle Brook Coal Co., Hazleton, Pa., and the Fuel Service Co., New York, will be merged to form the Markle Corporation, according to a recent announcement. A letter has been sent to stockholders of the companies outlining the plan of organization and designating Drexel & Co., Philadelphia, Pa., as the depository for the stocks.

Annual Election Held

W. D. Brennan, manager, Stag Canon branch, Phelps Dodge Corporation, Dawson, N. M., was re-elected president of the Colorado and New Mexico Coal Operators' Association at the annual meeting held in Denver, Colo., June 5. B. W. Snodgrass, president, Victor American Fuel Co., Denver, Colo., and F. O. Sandstrom also were re-elected to the offices of vice-president, and secretary-treasurer and traffic manager, respectively. W. D. Brennan, H. H. Bubb, Everett Drennen, A. N. Fancher, George Fruth, R. M. Perry, P. E. Rinehart, B. W. Snodgrass, J. van Houten, H. Van Mater and F. R. Wood were chosen as directors.

Wilson to Be Arbitrator In Illinois

William B. Wilson of Pennsylvania, Secretary of Labor under President Wilson, has been jointly selected as arbitrator by the Illinois Coal Operators' Labor Association and District No. 12 of the United Mine Workers.

© Underwood & Underwood

William B. Wilson

The appointment, announced at Chicago July 3, was made under the contract of last September, which provided that one man would be selected to arbitrate disputes which might fail of settlement through the regular channels of adjustment.

Mr. Wilson will make his headquarters in Illinois.

Federal Control Asked

A resolution recently adopted at a mass meeting at Pineville, Ky., was prsented to President Hoover June 20 by a committee of three residents, headed by William Turnblazer, president, District 19, United Mine Workers. The resolution was to the effect that the bituminous industry in southeastern Kentucky was at a low ebb and urged that Mr. Hoover get behind a proposition for government control of the industry. No comment was made by the Chief Executive other than the remark that he was acquainted with conditions in the industry and was giving the subject his consideration.

Lewis Requests Tariff On Oil Imports

Stating that no other American industry needs protection more than the fuel industry, John L. Lewis, president, United Mine Workers, in a letter to the Senate, on June 9, requested a tariff on imported petroleum which would protect the earnings of America's coal miners. Pointing out that imported fuel oil in 1927 displaced approximately 20 per cent of the American coal production, Mr. Lewis said that "even this displacement was so disastrous as to close a vast number of mines and to throw thousands of mine workers out of employment."

Old Timers to Meet

First-aid exercises at the Inter-Company First Aid and Mine Rescue Meet of the Union Pacific Coal Co. will be held in the new community building at Rock Springs, Wyo., July 19. The Fifth Annual Reunion of the Old Timers' Association will take place the following day.

The Old Timers' Association now has a membership of 447 men, which includes 20 in China, 35 with more than 40 years of continuous service and 33 retired on pensions. The new Old Timers' Building was dedicated under Masonic auspices at Rock Springs on May 28. Among those present at the exercises was James Moon, 77 years old, with a record of 55 years of continuous service.

Name Education Committee

In accordance with a resolution adopted at the Mining Engineering Education Conference held at Cincinnati, Ohio, during the annual convention of the American Mining Congress, a committee has been appointed to discuss the possibility of co-operating with institutions of learning to the end that the number of students taking engineering courses may be increased.

The chairman is Cadwallader Evans, general manager, Hudson Coal Co., Scranton, Pa., and the secretary is E. A. Holbrook, dean of science, University of Pittsburgh, Pittsburgh, Pa. Other members of the committee are A. J. Maloney, president, Philadelphia & Reading Coal & Iron Co., Philadelphia, Pa.; Harry L. Gandy, executive secretary, National Coal Association, Washington, D. C.; G. J. Anderson, president, Consolidation Coal Co., New York, and Eugene MacAuliffe, president, Union Pacific Coal Co., Omaha, Neb.

Urge Indiana Coal For Indiana

Recent efforts to promote the sale of Indiana coal within the state were given an impetus by Governor Leslie, who recently entertained about 250 persons, largely from business and official life, at a dinner in Indianapolis. Among the speakers were H. A. Glover, vice-president, Knox Consolidated Coal Co., and president, Coal Trade Association of Indiana; John E. Frederick, president, Indiana State Chamber of Commerce; Michael E. Foley, Indianapolis attorney, and James B. Pauley, chairman of the board, Miami Coal Co. Governor Leslie urged that state institutions be compelled to use Indiana coal.

Illinois Rates Cut

As a result of the action of the Supreme Court of Illinois, which denied the application of the carriers for reconsideration of a recent Supreme Court order upholding the action of the Illinois Commerce Commission, a reduction of 5c. a ton in freight rates from all Illinois mines to Chicago became effective June 18. The reduction, for the present time, will be applied only to the Chicago switching district.

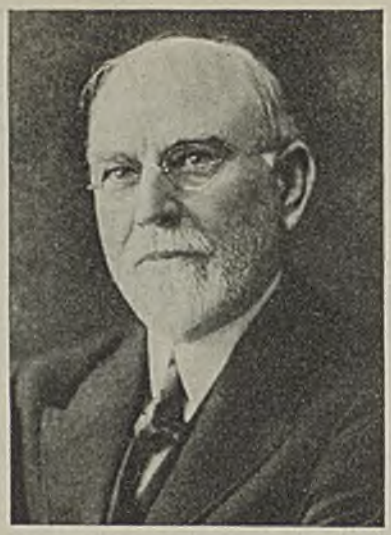
Anthracite Men Meet

High freight rates, loss of markets, excessive taxation and lack of cooperation on the part of labor were held to be the chief troubles of the anthracite industry by Frank W. Wagner, general manager, Lehigh Valley Coal Corporation, Wilkes-Barre, Pa., speaking at the meeting of the Anthracite Co-operative Association, held at Wilkes-Barre, June 18. Thomas Kennedy, international secretary-treasurer, United Mine Workers, agreed with Mr. Wagner in the main, but promised the help of labor in working out the problems confronting the industry.

IN THE NOTICE regarding the annual meeting of the Lehigh Valley Section of the American Institute of Electrical Engineers, appearing in the June issue of *Coal Age*, it is stated that S. Q. Hayes, general engineer, General Electric Co., described professional visits to Panama, Colombia and Ecuador. Mr. Hayes is general engineer of the Westinghouse Electric & Mfg. Co.

Refuses To Reopen Lake Case

The Interstate Commerce Commission on June 7 denied the petition of the Northern coal operators in Ohio and Pennsylvania and the Wheeling & Lake Erie R.R. to reopen the lake cargo coal case. No explanation was given by the Commission as to why the petition was denied.



James H. McGraw

James H. McGraw Honored

On June 12 the faculty of New York University conferred upon James H. McGraw, chairman of the board of the McGraw-Hill Publishing Co., Inc., the degree of Doctor of Commercial Science, in recognition of Mr. McGraw's many contributions to the advance of American business and science, through the publications of the companies he has founded.

Dr. George Alexander, president of the Council of New York University, in presenting Mr. McGraw for the conferring of the degree said: "James Herbert McGraw—Teacher, publisher of many technical periodicals, broad-minded and far-seeing man of business, is presented for the honorary degree of Doctor of Commercial Science."

The value of Mr. McGraw's services to business and science was emphasized by William H. Nichols, acting chancellor of New York University, who, in conferring the degree, said: "Educator transformed into publisher, you have never ceased to be an educator. Your notable career accentuates that tendency in commercial life through which, however, private its form, its operations have a public character and become an important element in public education."

Industrial Coal Reserves Drop to 26 Days

Stocks of anthracite and bituminous coal in the hands of industrial consumers in the United States and Canada on June 1 totaled about 31,250,000 tons, according to the monthly report of the National Association of Purchasing Agents. The number of days' supply went down to 26, equivalent to the low figure of April 1, 1926. The association states that "It would appear that to maintain a balanced condition in the coal industry stocks should not be allowed to fall to any extent below their present low level."

Warner Joins Aviation

Edward P. Warner, formerly Assistant Secretary of the Navy for Aeronautics, became editor of *Aviation*, a McGraw-Hill publication, July 1. Mr. Warner recently resigned as professor of aeronautical engineering at Massachusetts Institute of Technology. Earl D. Osborn, former publisher and editor of the paper, will continue his relationship as contributing editor.

Brady-Warner Co. Sold

Bondholders on June 27 purchased the West Virginia properties of the Brady-Warner Coal Co., Fairmont, W. Va., valued at between four and five million, on bids totaling $71,000. The auction was held under the direction of A. Spates Brady, special master.

New Plant Construction

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

Carbon Fuel Co., Carbon, W. Va.; contract closed with the Fairmont Mining Machinery Co. for engineering and erecting dry cleaning plant, capacity 250 tons per hour. One primary Peale-Davis table, capacity 200 tons per hour, and one secondary table, at 50 tons, will be supplied by the Pennsylvania Mining Machinery Corporation. Product to be crushed to 1¼ in.

Centralia Coal Co., Centralia, Ill.; contract closed with the Morrow Mfg. Co. for complete four-track steel tipple, capacity 400 tons per hour. To be completed Sept. 15.

Ennis Coal Co., Hiawatha, W. Va.; contract closed with Roberts & Schaefer for Arms screens and Arms air concentrators, capacity 60 tons per hour. To be completed Sept. 1.

Gulf Smokeless Coal Co., Covel, W. Va.; contract closed with Roberts & Schaefer for Menzies Hydro-Separator coal-washing equipment, capacity 50 tons per hour, to clean stove coal. To be completed Aug. 1.

Howell & Sill, Antrim, Pa.; contract closed with the Morrow Mfg. Co. for shaking screens, etc., for new tipple, capacity 125 tons per hour.

Jeddo-Highland Coal Co., Jeddo, Pa.; Highland No. 2 breaker re-equipped with one 13½-ft. Chance cone, to wash egg to pea inclusive, furnished by the Chance Coal Cleaner.

Lehigh Coal & Navigation Co., Lansford, Pa.; contract closed with the Chance Coal Cleaner for equipping Alliance breaker with one 15-ft. Chance cone to clean egg to buckwheat inclusive.

Lincoln Gas Coal Co., Lincoln Hill, Pa.; contract closed with the Fairmont Mining Machinery Co. for engineering and erecting air-cleaning plant, capacity 350 tons per hour of 6-in. to dust coal. Peale-Davis air tables will be supplied by the Pennsylvania Mining Machinery Corporation.

Ohio & Indiana Coal Co., Linton, Ind.; contract closed with Morrow Mfg. Co. for equipping new tipple, capacity 200 tons per hour, with shaking screens, etc.

Peerless Coal Co., Salt Lake City, Utah; contract closed with the Pittsburgh Boiler & Machine Co. for new tipple in Carbon County, capacity 400 tons per hour.

Philadelphia & Reading Coal & Iron Co., Pottsville, Pa.; two 18-ft. primary, four 15-ft. secondary and four 8x16-ft. fine-coal Chance cones to be installed in the Locust Summit breaker under rights purchased from the Chance Coal Cleaner. Steamboat to barley sizes, inclusive, will be treated.

Pond Creek Pocahontas Co., Bartley, W. Va.; contract closed with Roberts & Schaefer for complete four-track tipple equipped with Marcus screens, capacity 250 tons per hour. To be completed Oct. 1.

Sherwood-Templeton Coal Co., Linton, Ind.; Link-Belt Co. now constructing new tipple to include Link-Belt-Simon-Carves washers for preparing strip-mined coal. Product will be crushed to 1¼ in. in ring crusher supplied by the American Pulverizer Co.

National Fuels Meeting To Be Held

The Third National Fuels Meeting of the American Society of Mechanical Engineers, which will be held in Philadelphia, Pa., Oct. 7-10, will be in the nature of a fuels forum. A special effort is being made to include recommendations of societies other than the American Society of Mechanical Engineers as to the most effective manner in which the interests of the fuel man in general may be served.

The subjects to be discussed include the following: economics of reclamation of anthracite culm; burning refuse fuels; low-temperature carbonization; the atomic basis of combustion theory; economics of gas, coal and oil fuels; economics of oil production; heat value of fuel; coal pre-treatment; slag accumulations on boiler tubes; air needed for combustion of different fuels; design of furnace for tunnel kilns; development of refractories to meet needs of users; producer gas in brick kilns; fuel burning in ceramic and lime industries; application of fuels in the cement industry; burning pulverized anthracite; recent developments in stoker design; burning coarse coal in suspension; proper methods of pulverized fuel sampling; low-temperature coke for marine service; pulverized fuels in marine practice; methods of recording smoke; the effect of pulverized fuel ash on the penetration of ultra-violent rays and smoke abatement at Salt Lake City.

Fewer Men, Lower Earnings At Mines in April

Employment in coal mining — anthracite and bituminous—decreased 3.1 per cent in April, 1929, as compared with March, and payroll totals decreased 12.1 per cent, according to the monthly Labor Review of the U. S. Department of Labor. The 1,364 mines for which reports were received had 306,898 employees in April whose combined earnings in one week were $7,339,426.

Employment in anthracite mines alone was 2.8 per cent greater in April, 1929, than in March and payroll totals were 2.7 per cent smaller. Employment in bituminous coal mines was 6.2 per cent lower in April, 1929, than in March, and payroll totals were 17.8 per cent lower. These figures are based upon reports from 1,206 mines in which there were in April 192,835 employees whose combined earnings in one week were $4,242,316.

There were seasonal decreases in employment in April in each of the eight geographic divisions from which reports are received, and decreases in employees' earnings except the Pacific, in which, despite a drop in the number of employees, there was a considerable increase in the payroll totals caused by a greater number of days of operation in April in more than one-half the mines reported. The outstanding decreases were approximately 40 and 55 per cent in the two items, respectively, in the West South Central division, where there was little market for domestic coal in April.

The details for each geographic division are shown in the accompanying table.

W. Va. Coal & Coke Co. to Reorganize

A recent reorganization plan announced by the bondholders' receivers' committee provides for $2,400,000 more working capital for the West Virginia Coal & Coke Co. When the property of the old company is sold by court order, July 9, it will be bid in by banks representing the bondholders and turned over to the new company, the West Virginia Coal & Coke Corporation.

Employment and Payroll Totals in Identical Bituminous Coal Mines In March and April, 1929

	Mines	Number on Payroll March, 1929	Number on Payroll April, 1929	Per Cent Change	Amount of Payroll March, 1929	Amount of Payroll April, 1929	Per Cent Change
Middle Atlantic	353	62,052	59,231	— 4.5	$1,582,568	$1,420,654	—10.2
East North Central	191	36,585	33,670	— 8.0	954,681	688,782	—27.9
West North Central	56	5,134	4,214	—17.9	130,978	82,756	—36.8
South Atlantic	270	44,154	41,946	— 5.0	1,098,056	886,106	—19.3
East South Central	228	43,607	41,777	— 4.2	942,457	825,484	—12.4
West South Central	19	1,600	962	—39.9	42,048	18,952	—54.9
Mountain	78	10,924	9,598	—12.1	366,288	269,931	—26.3
Pacific	11	1,561	1,437	— 7.9	44,911	49,651	+10.6
	1,206	205,617	192,835	— 6.2	$5,161,987	$4,242,316	—17.8

Per Cent Change in Each Line of Employment March to April, 1929

	Establishments	Employment March, 1929	Employment April, 1929	Per Cent Change	Payroll in One Week March, 1929	Payroll in One Week April, 1929	Per Cent Change
Manufacturing	12,501	3,542,538	3,563,150	+0.5*	$99,428,990	$100,526,951	+ 0.7*
Coal mining	1,364	316,601	306,898	—3.1	8,346,156	7,339,426	—12.1
Anthracite	158	110,984	114,063	+2.8	3,184,169	3,097,110	— 2.7
Bituminous	1,206	205,617	192,835	—6.2	5,161,987	4,242,316	—17.8
Metalliferous mining	319	52,567	54,551	+3.8	1,625,053	1,715,059	+ 5.5
Public utilities	8,843	653,996	667,830	+2.1	19,657,110	19,735,803	+ 0.4
Trade	5,386	201,066	200,136	—0.5	5,021,101	5,004,246	— 0.3
Wholesale	1,171	41,329	41,579	+0.6	1,257,226	1,248,374	— 0.7
Retail	4,215	159,737	158,557	—0.7	3,763,875	3,755,872	— 0.2
Hotels	1,543	140,825	139,080	—1.2	2,408,366†	2,342,786†	— 2.7
	29,956	4,907,593	4,931,645	+0.5	$136,486,776	$136,664,271	+ 0.1

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

Consolidation Coal Co. Insures Employees

Approximately 10,000 employees of the Consolidation Coal Co. and subsidiary companies will receive group life insurance protection through a $35,000,000 program underwritten by the Equitable Life Assurance Society of the United States. In addition to the death benefit, provision also has been made for the payment of stipulated sums to those employees who are totally disabled for a temporary period as a result of illness or accident. No medical examination is required and the cost to the employee is low, as the company will pay a substantial part of the premiums. Over 95 per cent of the employees applied for policies within three weeks after the offer was made.

Glen Rogers Explosion Kills Four

Four men were killed in a local explosion at the Glen Rogers mine of the Raleigh-Wyoming Coal Co., Glen Rogers, W. Va., June 13. The dead are Louis Prey, Springfield, Ill.; M. R. Stafford, Kelleyville, W. Va.; Charlie Perdue, Glen Rogers, and Ben Morris, West Frankfort, Ill. Sixty-one other miners escaped without injury and rock-dusting was given credit by mine and state officials for preventing the spread of the explosion. The cause remains undetermined pending an investigation by state officials.

Coming Meetings

Inter-Company First Aid and Mine Rescue Meet, Union Pacific Coal Co.; July 19, Rock Springs, Wyo.

Fifth Annual Reunion, Old Timers' Association, Union Pacific Coal Co.; July 20, Rock Springs, Wyo.

Annual First-Aid Meet of the Harlan County Coal Operators' Association; Aug. 24, Harlan, Ky.

Twelfth Annual Meeting on "Human Relations in Industry," under auspices of the Industrial Department, National Council, Young Men's Christian Association; Aug. 28-Sept. 1, at Silver Bay on Lake George, N. Y.

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

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

New York State Coal Merchants' Association; annual convention, Sept. 26-28, at Saranac Inn, Upper Saranac, N. Y.

National Safety Council; annual congress of the Mining Section, Sept. 30 to Oct. 4, at Chicago, with headquarters at Stevens Hotel.

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

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

The Canadian Institute of Mining and Metallurgy; annual Western meeting Oct. 9-11, at Edmonton, Alberta, Canada.

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

Workmen Responsible For Mine Blast

W. B. Hillhouse, chief mine inspector for Alabama, in a report to Governor Bibb, placed the responsibility for the explosion at the Connellsville mine of the Yolande Coal & Coke Co., Yolande, Ala., May 27, which caused the death of ten men, on employees of the company. Sparks from a dynamo caused the explosion and the report disclosed that the state mine inspector had been discharged for failure to report that the fan, installed to remove gas, had been stopped for several hours before the explosion.

Hillman Buys Mine

The Hillman Coal & Coke Co., Pittsburgh, Pa., increased its operations in Fayette County, Pennsylvania, to ten by the recent purchase of the Thompson No. 1 mine of the Redstone Coal & Coke Co., at Republic, Pa. The mine, which normally employs 250 men, will go to the Hillman interests on Aug. 1.

Obituary

RALPH W. CLARK, vice-president and general sales agent of the Hudson Coal Co., died at his home in Scranton, Pa., July 5, of typhoid fever. Prior to his joining the Hudson Coal Co., in September, 1928, Mr. Clark was for four years vice-president of Pilling & Co.

LOUIS RODMAN PAGE, president, Crozer-Pocahontas Co., died July 2 at his home, Aramink Farm, Bryn Mawr, Pa., at the age of 68 years. Mr. Page, who was graduated from the University of Pennsylvania in 1883, also was a director of the Pennsylvania Coal Co. and the Westmoreland Coal Co.

Bureau of Mines Issues Permissible Plates

Approvals of permissible mining equipment issued by the U. S. Bureau of Mines during the months of May and June are as follows:

(1) Bertrand P. Tracy Co.; pit-car loader; General Electric Co. 1-hp. motor and Ohio Brass Co. starter. 230 volts, d.c.; Approval 174; May 22.

(2) Manch Storage Battery Locomotive Co.; Mancha two-motor gathering locomotive; battery, 54 cells Ironclad Exide, 33 plate, or 54 cells Philco, 39 plate; Approval 1520; May 27.

(3) Chicago Automatic Conveyor Co.; pit-car loader; Goodman Mfg. Co. 1-hp. motor and interlocked fuse and switch, 500 volts, d.c.; Approval 175-A; June 24.

E. B. WILSON, editor of *Colliery Engineer* from 1908 until its absorption by *Coal Age* in 1915, died at his home in Scranton, Pa., June 16. He was born in New Haven, Conn., in 1859 and began his career with Coxe Bros.

JAMES P. CONNERY, vice-president, Miami Coal Co., died at his home in Chicago, June 30, of stomach trouble. Mr. Connery, who was 63 years old, was connected with the Silver Creek & Morris Coal Co. and the Philadelphia & Reading Coal & Iron Co. before joining the Miami company.

W. G. DUNCAN, president of the W. G. Duncan Coal Co., Greenville, Ky., died at his home in June 10 after an illness of several months. Mr. Duncan, who was 78 years old, was engaged in the coal business in Muhlenburg County for about 30 years and previously had owned property and operated mines in Ohio County.

Truax-Traer Opens Mine

The Truax-Traer Coal Co., Chicago, recently added to its stripping operations by the purchase of the deep mine of the Saline County Coal Corporation, at St. David, Fulton County, Ill.

Personal Notes

W. C. SHUNK, general manager, Stonega Coke & Coal Co., Big Stone Gap, Va., has been appointed to the committee on coal mine ventilation by the American Mining Congress.

S. F. BALLIF, JR., president, Royal Coal Co., Salt Lake City, Utah, has been elected president of the Utah Coal Producers' Association, succeeding the late John H. Tonkin. Lynn Thompson, president, Peerless Coal Co., has been made vice-president, succeeding the late Frank N. Cameron.

J. H. MARKS, formerly vice-president in charge of operations, Colorado Fuel & Iron Co., Denver, Colo., has been appointed general manager of the Independent Coal & Coke Co., Salt Lake City, Utah, succeeding the late John H. Tonkin.

JOHN BOYLAN, Scranton, Pa., president. District No. 1, United Mine Workers, was re-elected to that office June 13, defeating Rinaldo Cappellini, of Pittston.

DEXTER S. KIMBALL, dean of the College of Engineering, Cornell University, and member of the American Society of Mechanical Engineers and the Society for the Promotion of Engineering Education, has been elected to the board of directors of the McGraw-Hill Publishing Co., Inc.

King Coal's Calendar for June

June 3—Offices of the New Indiana State Coal Bureau, created through the joint efforts of the Indiana Coal Operators' Association, District No. 11, United Mine Workers, and Governor Leslie, to promote a wider sale of Indiana coal, opened in Indianapolis, Ind.

June 7—House Bill No. 685 of the General Assembly of the State of Illinois, virtually outlawing the electric safety cap lamp in Illinois, defeated by a vote of 59 to 34, 18 votes less than the constitutional majority. A similar bill had previously been passed by the Senate.

June 7—Interstate Commerce Commission denies the petition of the Northern coal operators in Ohio and Pennsylvania and the Wheeling & Lake Erie R. R. for reopening of the lake rate case. No explanations were offered by the Commission.

June 9—John L. Lewis, president, United Mine Workers, in a letter to the U. S. Senate, requests that a tariff be placed on imported petroleum to protect the earnings of America's coal miners. Mr. Lewis stated that stopping the free flow of petroleum would do much to revive coal mining.

June 11-12—American Wholesale Coal Association meets in Pittsburgh, Pa. Holds that future of the coal industry is largely dependent upon widespread adoption of modern merchandising methods.

June 13—Explosion at Glen Rogers mine of the Raleigh-Wyoming Coal Co., Glen Rogers, W. Va., kills four men. Sixty-one others escape and rock-dusting is said to have prevented the spread of the blast.

June 14—Governor Leslie outlines plan for boosting Indiana coal at dinner given in Indianapolis. Other men prominent in business and politics attend and express their views.

June 18—Reduction of 5c. a ton in freight rates on coal from all Illinois mines to Chicago goes into effect after State Supreme Court denies application of carriers for reconsideration of an order by the Illinois Commerce Commission.

June 19—U. S. Shipping Board steamer "West Alsek," equipped with the Todd system of crushing and burning pulverized coal, successfully completes sea trial off Fire Island and is accepted by the Shipping Board. She will proceed to Baltimore to load cargo and will sail from New York to Avonmouth, England, about July 3.

June 20—Just and reasonable rules for reweighing of coal and coke sought by Corn Belt Coal Merchants' Association, Des Moines, Iowa, in a complaint against the Atchison, Topeka & Santa Fe R. R. filed with the Interstate Commerce Commission.

June 20—Strong dissatisfaction expressed with the profit-sharing plan of the British Empire Steel Corporation at district convention of United Mine Workers at New Glasgow, N. S. Vice-President Muir characterizes it as "the most disappointing event of the year."

June 20—Delegation of citizens of Pineville, Ky., headed by William Turnblazer, president, District 19, United Mine Workers, asks President Hoover to get behind proposition for federal control of coal industry.

June 28—Hope of rescuing 50 miners entrapped in Matsushima mine near Kyushiu, Japan, by a flood is abandoned after a rescue party, its numbers unknown, is cut off when the safety doors burst, completely flooding the mine.

Washington Letter

By Paul Wooton
Special Correspondent

A CHAPTER in the mechanization of American industry has been written since the war, by the State of Wyoming. According to figures of the U. S. Bureau of Mines, Wyoming leads all other states in the percentage of coal loaded mechanically. In 1928, 41 per cent of the total output of the state was loaded either by loading machines proper, by pit-car loaders, or face conveyors. The average for the United States is only 4.5 per cent. A number of the larger mines, both in southern Wyoming and in the northern part of the state, have been mechanized completely. The Sheridan district is virtually on a mechanical basis at this time.

All of this has come about in five years' time. This development has increased greatly the output per worker. In 1923 the average was 5.23 tons per man per day. Each succeeding year has shown an increase until the figure in 1928 had climbed to 6.34. Sheridan County has an output of 12.89 tons per man per day. This is the highest figure for underground mines in any county of the United States or in the world.

The higher output per man correlated with a reduction of cost has tended to concentrate business in the larger mines. As a result the average time worked has increased. In 1923 it was 192 days. In 1928 it rose to 214 days. This was in spite of the fact that the demand was smaller in 1928.

Most striking of all is the decrease in the number of men required. In 1923, before mechanical loading was introduced, the mines required 7,529 men. In 1928 the number had dropped to 4,843 men. This is a decrease in the working force of 30 per cent in five years. Some of the decrease was accounted for by the discharge of men but the policy of the Union Pacific Coal Co., the largest producer, has been to introduce machines only as fast as there was a normal turnover in the working force through death, superannuation and voluntary separation. Having announced that no man would be discharged to make room for machines, the company found that the objection of the union disappeared.

By this policy, followed also by some of the other operators, the state was able to mechanize 40 per cent of its tonnage without inflicting serious hardship upon the miners. Throughout this period it has maintained contractual relationship with the United Mine Workers and its wage rate has been higher than that of the old Central Competitive Field.

The state's ability to pay these wages has been effected by the fact that much of the tonnage was assured of an outlet through ownership of mines by railroads, but in addition the increased production of the workers brought about by mechanization has helped. In 1923 the average tonnage per man per year was a trifle over 1,000. In 1928 it had increased to 1,360, a gain of over one-third in five years.

The ability of an American industry to pay high wages turns on high output per worker, all admit. This results in a higher buying power and ability to absorb products of all industries. The person who is producing one-third more than he did five years ago is a better customer not only of those who produce the necessities of life but of those who produce the less essential articles and the luxuries.

"West Alsek" Passes Test

As a result of the successful sea trial of the U. S. Shipping Board freighter "West Alsek" off Fire Island on June 19, officials of the Board accepted her from the Todd Shipyards Corporation at the conclusion of the run and immediately ordered her to proceed to Baltimore to load cargo for Avonmouth, England, sailing from New York about July 3. This vessel was donated by the Shipping Board about two years ago for experimental work in the use of pulverized coal on shipboard and was equipped with the Todd unit system of burning pulverized fuel. In the course of the trial, which was of 12 hours' duration, the vessel was subjected to every possible maneuver, including a run over a 32-mile course at an average speed of 12.7 knots. Her speed when loaded is expected to be 10 knots.

The coal-pulverizing machinery and burners on the "West Alsek" were developed by the engineers of the Todd Shipyards Corporation in co-operation with the Erie City Iron Works and the fuel experts of the fuel conservation committee of the Shipping Board, working under the direction of Carl J. Jefferson. Freedom from encroachment on the space beyond the fireroom, the compactness of the mills and the high degree of fineness of pulverization are said to be the outstanding features of the installation.

Continental Coal Co. Acquires Mine

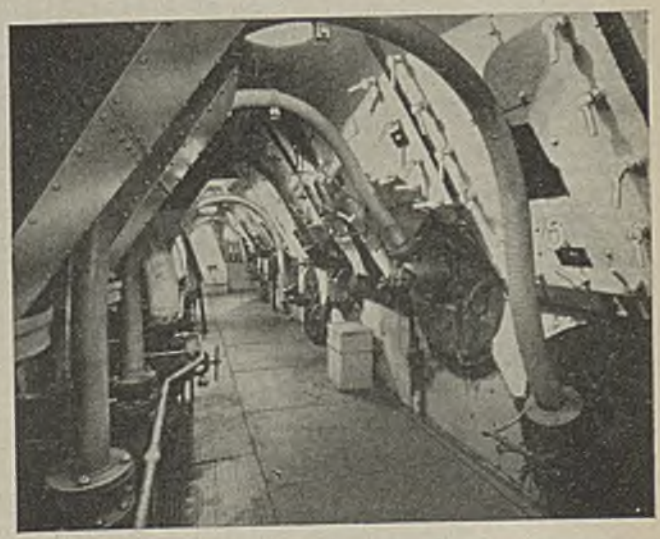
By purchasing the Parker Run nine of the Monongahela Fuel Co., on June 5, the Continental Coal Co., Fairmont, W. Va., has increased its holdings of coal land in northern West Virginia to approximately 9,000 acres. The property purchased by the Continental company includes 1,000 acres of coal land, the Parker Run mine, with a capacity of 3,000 tons per day, and the mining town and surface plant. The consideration involved was not given.

The Parker Run mine adjoins the Sands mine of the Continental company and will continue in operation under the new management. Operations also will be renewed at the Chesapeake mine of the Continental company, which has been closed down for several months.

The Clinch River Fuel Co., consisting principally of New York capitalists, has recently been chartered to lease and develop the Hagan coal properties on Stony Creek, near Dungannon, Va., according to Charles F. Hagan, secretary-treasurer of the Hagan Trustee Syndicate. It is understood that sufficient capital will be put into the development to make this one of the large enterprises in southwest Virginia.

Holding Company Formed

A plan providing for the change of stock to no-par shares and the formation of a holding company under a Delaware charter was approved by the stockholders of the Westmoreland Coal Co. at a recent meeting. The present authorized 250,000 shares of $50 par value stock will be changed to 250,000 shares of stock of no par value and 200,000 shares of this stock will be issued to holders of the present outstanding 200,000 shares of $50 stock. The new holding company will have 200,000 shares of no-par-value stock which will be distributed to holders of Westmoreland Coal stock on the basis of one share of the new stock for one share of the old.



Burner Side, Todd Unit System Of Pulverized Coal Burning

Coal-Mine Fatalities in May Show Decline From Previous Month and Year Ago

ACCIDENTS in the coal-mining industry of the United States in May, 1929, resulted in the death of 148 men, according to information received from state mine inspectors by the U. S. Bureau of Mines. The death rate per million tons was 3.18 for the industry as a whole, based on a production of 46,480,000 tons of coal. The fatality rate for bituminous mines alone was 2.89, based on a production of 40,172,000 tons, and that for anthracite, with a production of 6,308,000 tons, was 5.07.

The fatality rate for May a year ago, including four explosions causing 230 deaths, was 8.72, based on 390 fatalities and 44,748,000 tons, the rate for bituminous mines being 9.17, based on 336 deaths and 36,624,000 tons, and that for anthracite mines being 6.65, based on 54 deaths and 8,124,000 tons. Without the deaths from these explosions the fatality rate would have been 3.17 for bituminous, 5.42 for anthracite, and a total of 3.58, which are normal figures. Using these figures the rates for May, 1929, are still slightly lower than for the month a year ago. Compared with April, 1929, there is also a slight decrease for anthracite and the total, while the rate for bituminous is practically the same.

During the first five months of 1929, accidents at coal mines caused the death of 828 men. The production of coal for this period was 246,934,000 tons, with a death rate of 3.35, as against 4.45 for the same five months of 1928, based on 1,023 deaths and 230,128,000 tons of coal. The record for bituminous coal alone from January to May, 1929, was 647 fatalities and 215,134,000 tons, with a fatality rate of 3.01; while that for anthracite showed 181 deaths, 31,800,000 tons of coal, and a death rate of 5.69. The same period for 1928 showed 825 deaths in bituminous mines with 198,326,000 tons mined, giving a rate of 4.16; that for anthracite showed 198 fatalities and 31,802,000 tons mined, with a death rate of 6.23. For both bituminous and anthracite 1,023 deaths were reported, with 230,128,000 tons produced and a fatality rate of 4.45.

One major disaster in which five or more lives were lost occurred at Yolande, Ala., May 27, causing the death of 10 men. The first five months of 1929 showed 3 major disasters with a loss of life of 70 men as compared with 8 disasters and 284 deaths during the first five months of 1928. Based exclusively on major disasters the death rate in 1929 was 0.283 as compared with 1.234 for the same period of 1928.

A comparison of the accident record for the first five months of 1928 and 1929 follows:

	Year 1928	Jan.-May 1928	Jan.-May 1929
All causes	3,812	4,445	3,353
Falls of roof and coal	1,868	1,851	1,758
Haulage	.632	.574	.672
Gas or dust explosions:			
Local explosions	.088	.105	.069
Major explosions	.572	1.234	.283
Explosives	.130	1.60	1.30
Electricity	.155	.143	.113
Other causes	.367	.378	.328

First Aid Certificates To Be Awarded

Twenty mines will receive honor certificates from the U. S. Bureau of Mines for 100 per cent first aid training. The list includes the following mines: Nos. 2 and 9, Madison Coal Corporation, Chicago; Nos. 7, 10 and 12, Rock Island Improvement Co., Hartshorne, Okla.; Nos. 2, 8 and 9, West Kentucky Coal Co., Sturgis, Ky.; Nos. 1 and 2, Lake Superior Coal Co., Superior, W. Va.; Carbonado, Pacific Coast Coal Co., Carbonado, Wash.; Springdale, Allegheny-Pittsburgh Coal Co., Parnassus, Pa.; Natrona, Pennsalt Coal Co., Natrona, Pa.; Melcroft, Melcroft Coal Co., Melcroft, Pa.; Mona, Arkwright Coal Co., Morgantown, W. Va.; New Black Diamond, Pacific Coast Coal Co., Renton, Wash.; Derby, Dunbar and Imboden, Stonega Coke & Coal Co., Big Stone Gap, Va., and Eureka, Bertha Consumers Co., Morgantown, W. Va.

Safety Trophies Awarded

Jeddo No. 7 mine of the Jeddo-Highland Coal Co., Jeddo, Pa., and No. 4 mine of the United States Coal & Coke Co., Thorpe, W. Va., were the anthracite and bituminous winners in the National Safety Competition conducted by the U. S. Bureau of Mines in 1928. Each will receive the bronze "Sentinels of Safety" given by the *Explosives Engineer*. No. 4 mine employees worked 418,869 hours and had three injuries representing 33 days' disability. The severity rate was 0.053 and the frequency rate 7.2.

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

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

State	Underground											Shaft					Surface							Total by States	
	Falls of roof (coal rock, etc.)	Falls of face or pillar coal	Mine cars and locomotives	Explosions of Gas or Coal Dust	Explosives	Suffocation from mine gases	Electricity	Animals	Mining Machines	Mine fires (burned suffocated, etc.)	Other causes	Total	Falling down shafts or slopes	Objects falling down shafts or slopes	Cage, skip or bucket	Other causes	Total	Mine cars and mine locomotives	Electricity	Machinery	Boiler explosions or bursting steam pipes	Railway cars and locomotives	Other causes	Total	1929	1928
Alabama	2		2	10			1					15													15	9
Arkansas				1								1													1	0
Colorado		1	1									2													2	3
Illinois	3				1							4									1			1	5	3
Indiana											1	1													1	2
Iowa	1											1													1	2
Kansas			1									1													1	0
Kentucky	7	2	2				2					13													13	21
Maryland			1									1													1	1
Michigan																									0	2
Missouri																									0	1
Montana			1									1								1				1	2	1
New Mexico																									0	0
North Dakota																									0	0
Ohio	4		1									5													5	4
Oklahoma																									0	4
Pennsylvania (bituminous)	14	1	6		1		3					25							1					1	26	223
Tennessee	1		1									2													2	4
Texas																									0	0
Utah	2											2													2	0
Virginia	3											3													3	0
Washington																									0	1
West Virginia	11	1	16				3		3			34													34	52
Wyoming		1	1									2													2	3
Total (bituminous)	48	6	33	11	2		9		3		1	113							1	1	1			3	116	336
Pennsylvania (anthracite)	16	3	3	1	2	1						26	2				2			2			1	4	32	54
Total, May, 1929	64	9	36	12	4	1	9		3		1	139	2				2	1	1	3	1			7	148	
Total, May, 1928	78	13	32	234	3	1	11		5		4	381	1	1	1	1	4	1		1			3	5		390

Among the Manufacturers

JOHNS-MANVILLE CORPORATION, New York, has removed the Milwaukee office of its Western sales division to the Railway Exchange Building, 97 East Wisconsin Ave.

* * *

THE LINCOLN ELECTRIC CO., Cleveland, Ohio, has appointed B. W. Brown as district sales representative with headquarters at Milwaukee, Wis. G. O. Forseth has been promoted to district sales representative with headquarters at Minneapolis, Minn.

* * *

J. R. MCDERMET, formerly research engineer and manager of the heater and de-aerator departments of the Elliott Co., Jeanette, Pa., has been appointed chief engineer. S. C. Miller has been named district manager with offices at 1101 Security Building, Denver, Colo.

* * *

BRODERICK & BASCOM ROPE CO., St. Louis, Mo., has appointed Wells Fargo & Co. Express, S. A., as distributors of its wire rope in Mexico.

* * *

THE WAGNER ELECTRIC CORPORATION, St. Louis, Mo., has moved its Buffalo service station and branch sales office to a new building at 1796 Main St. The new building has been built according to Wagner specifications to facilitate service work and the handling of the Wagner line.

* * *

J. S. TRITLE, formerly in charge of the manufacturing operations of the Westinghouse Electric & Manufacturing Co., was elected vice-president at a directors' meeting, May 27. Mr. Tritle will have his headquarters at the main plant at East Pittsburgh, Pa.

* * *

THE JEFFREY MANUFACTURING CO., Columbus, Ohio, has appointed John L. Connors, former president of the Morgan-Gardner Electric Co., assistant general manager of the company. Mr. Connors will have special duties and responsibility in the management of the subsidiary companies, which include the British Jeffrey Diamond, Ltd., Wakefield, Eng.; Jeffrey Manufacturing Co., Ltd., Montreal, Canada, and the Galion Iron Works & Manufacturing Co., Galion, Ohio.

A. I. APPLETON, president and treasurer, Appleton Electric Co., Chicago, announces the purchase of the Gem "Powerlet" line of conduit fittings from the Jefferson Electric Co., formerly the Chicago-Jefferson Fuse & Electric Co.

* * *

THE FORD CHAIN BLOCK CO. has appointed C. A. Anderson as sales manager with headquarters at the general offices and works, Philadelphia, Pa.

* * *

GEORGE F. MOSHER, auditor of disbursements, was elected assistant treasurer of the General Electric Co. at a recent meeting of the board of directors. Mr. Mosher entered the employ of the company in 1919, accepting a position in the accounting department. In 1925 he became assistant to the treasurer, and in 1927 was appointed auditor of disbursements.

* * *

HUGH W. SANFORD, of the Sanford-Day Iron Works, Knoxville, Tenn., announces the appointment of Fred J. Moses as sales promotion manager. Mr. Moses will have charge of advertising, sales promotion and publicity.

* * *

THE GENERAL REFRACTORIES CO. has moved its Cleveland, Ohio, office to 1126 Leader Building. The Buffalo address of the company also has been changed to 1210 Genesee Building.

* * *

NEW oxygen-producing plants recently added to the chain of the Linde Air Products Co., New York, have been put in operation at 1000 W. Washington Ave., Oklahoma City, Okla.; 2603 Floyd St., Louisville, Ky., and 150 Stockton St., Jacksonville, Fla.

* * *

THE CHICAGO OFFICE of the American Hoist & Derrick Co. has moved to 1000 Engineering Building, 205 Wacker Drive. The Pittsburgh, Pa., branch has been removed to 901 Farmers Bank Building.

* * *

EDWARD L. RYERSON, JR., recently was elected president of Joseph T. Ryerson & Son, Inc., Chicago, succeeding Joseph T. Ryerson. The new president will continue to hold the offices of treasurer and member of the board.

FRANK J. FOLEY, formerly with *Coal Mine Management*, has returned to the Edison Storage Battery Co., Orange, N. J., as manager of the mining section. Mr. Foley was manager of the mining section of the Westinghouse Electric & Mfg. Co. until 1918, when he joined the sales force of the Edison company as manager of mine locomotives and cap lamps. He resigned in 1920 to go with *Coal Mine Management*.

* * *

E. J. SCHWANHAUSSER, assistant manager of the Harrison works, Worthington Pump & Machinery Corporation, Harrison, N. J., accompanied by his wife and son, is taking a business and pleasure trip through Europe. He will visit power and industrial plants in England, France and Germany and discuss matters of mutual interest with many of the leading engineers on the Continent.

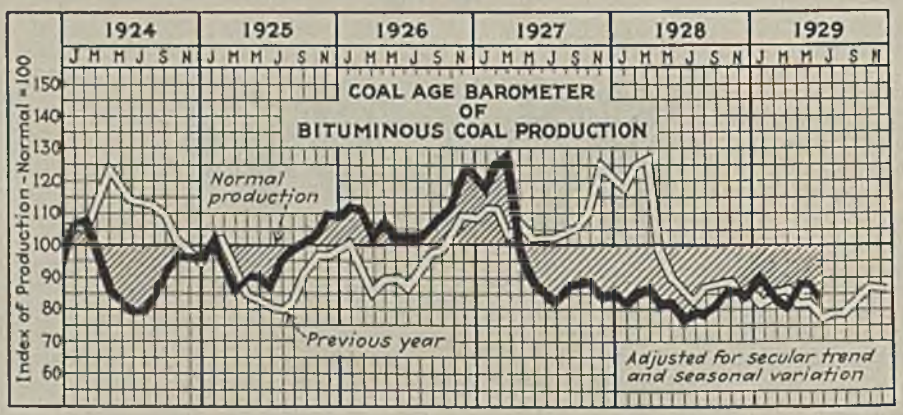
* * *

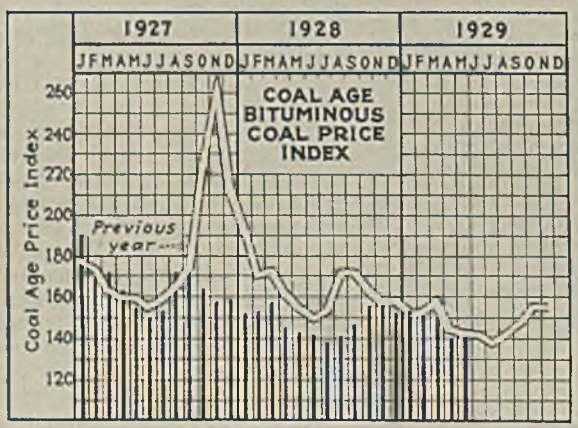
G. A. BURNHAM, formerly president of the Condit Electrical Manufacturing Corporation, assistant to the president of the American Brown Boveri Electric Corporation and general manager of the electrical-mechanical division, has been elected president of the American Brown Boveri Co., Inc., Camden, N. J. This company is a newly formed subsidiary of the American Brown Boveri Electric Corporation, created for the purpose of placing all electrical and mechanical operations, exclusive of shipbuilding, under one management. The plant of the American Brown Boveri Co., Inc., is located at Camden, N. J., and its principal products are transformers, steam turbines, blowers and compressors, mercury arc rectifiers, electric locomotives and railway equipment. The entire capital stock of the Condit Electrical Manufacturing Corporation is owned by this company, but it will continue to manufacture and sell its electrical control and protective equipment through its own organization.

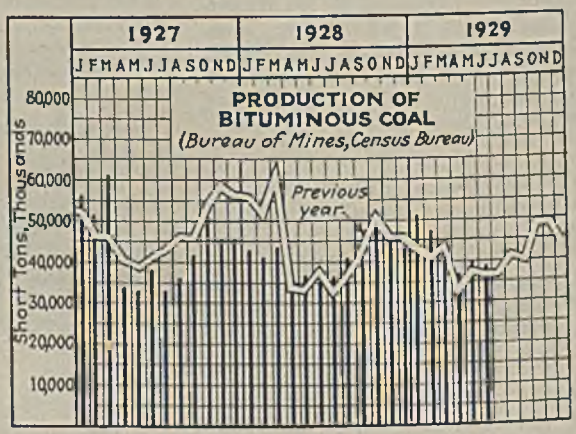
* * *

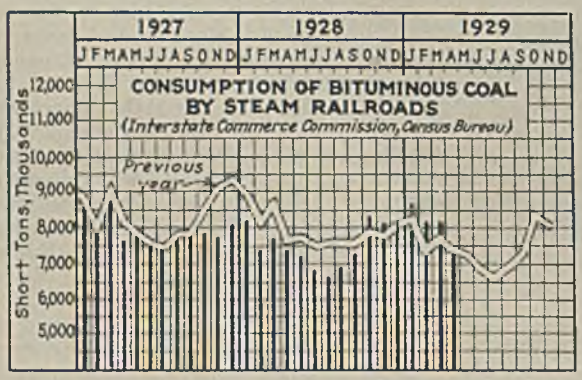
THE COPPERWELD STEEL CO., Glassport, Pa., has formed a Southeastern district composed of Georgia, Alabama, Tennessee, Florida, Mississippi and part of Louisiana. P. A. Terrell, with offices in the American Traders Bank Building, Birmingham, Ala., has been appointed district manager.

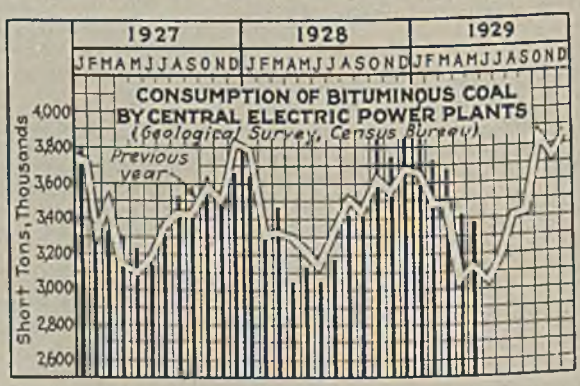
Indicators of Activities in the Coal Industry

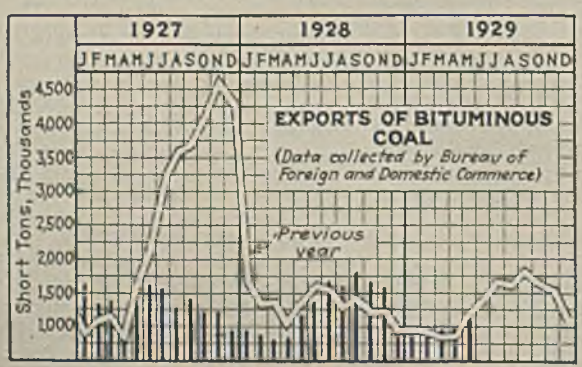


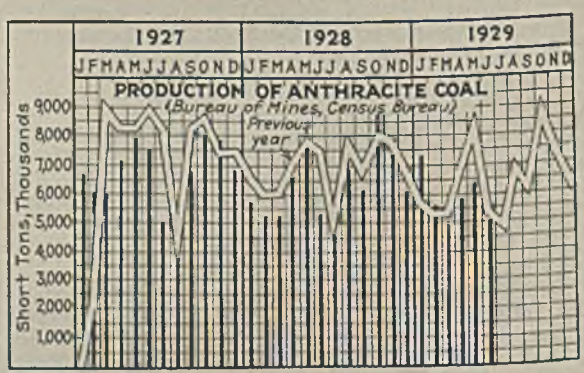












MARKETS *in Review*

WHILE no notable advances were recorded in the coal markets of the country in June, indications were that better times are ahead. Little improvement in contracting by railroads and stocking by industrial users was noted, and retailers, hampered by collection difficulties and buyer reluctance, failed to purchase in expected quantities. These facts, however, coupled with the satisfactory business condition throughout the country are expected to lead to an increased demand later in the year. Slack maintained a favorable position throughout the month as a result of curtailed production.

June output is estimated by the U. S. Bureau of Mines at 37,900,000 net tons. This is a decrease of 2,272,000 tons from the May production and an increase of 1,012,000 over June of last year. In spite of the decrease in production prices failed to increase over last month. *Coal Age* Index of spot bituminous prices was 139 on June 1; 141, June 8; 138, June 15, and 137, June 22 and 29. The corresponding weighted average prices were $1.68, June 1; $1.71, June 8; $1.67, June 15, and $1.66, June 22 and 29. These are preliminary figures. Revised figures for May were 139, May 4; 138, May 11 and 18, and 139, May 25. The corresponding weighted average prices are $1.68, May 4; $1.67, May 11 and 18, and $1.68, May 25. The monthly Index for May was 138½ as compared to the June unrevised figure of 138⅝.

Movement to the lakes continued steadily throughout the month at a slightly higher rate than the corresponding period of last year. Dumpings at the lower lake ports for the season to July 1 were 3,363,986 tons over the totals for the corresponding period in 1928. Cargo dumpings to July 1 were 13,090,987 tons and bunker fuel loadings were 501,405 tons.

Anthracite maintained practically an even tone throughout the month of June, though slight advances were noticeable in some localities. Curtailed production kept the output moving fairly uniformly and prevented the piling up of surpluses in any one size. Price increases were scheduled for July 1 in all the principal markets, and the imminence of further advances, coupled with the approach of fall, is expected to stimulate domestic demand.

CONTRACT shipments were the principal item in the Chicago coal market in June. Deliveries in most cases were at the full rate and proved sufficient to meet the industrial demand. Additional buying was unnecessary and the spot market failed to show signs of strength.

Screenings from Illinois, Indiana and western Kentucky lagged in spite of a slight movement in domestic sizes. Indiana and western Kentucky operators often were compelled to ship prepared sizes on mine-run contracts and the resultant screenings from Indiana brought $2.50@$2.70 delivered and from Kentucky, 70c. f.o.b. mines. Mine-run from these localities sold at practically the same price as screenings. Southern Illinois operators maintained screenings prices at $1.75@$1.85, though the movement was slight. They also announced increases of 15, 10 and 5c. on lump, egg and nut, respectively, effective July 1. Industrial buyers gave various reasons for failing to place orders, the predominating one being the approaching holidays. Producers of the best grades anticipate an improvement in demand after July 4.

SMOKELESS coals moved well on contracts during the month and lump and egg were firm among the leading producers. Egg was in the best demand with some operators asking $3. Stove and nut have improved as a result of heavy shipments of surplus tonnage to the lakes. Mine-run held its own at $1.75@$2. Eastern high-volaitle coals were almost a drug in the market. Good grades of block could be had at $1.90@$2 and egg at $1.75. Coke is the principal fuel being stocked by Chicago retailers, as the demand for bituminous coal has been very disappointing. Bad credit conditions and slow payments also are deterring buying, and low prices hold no attraction to the majority of householders.

The St. Louis coal market was unusually quiet during the month of June and the demand for steam coal hit new low marks. The domestic movement was fairly good. Coke and Arkansas anthracite moved easily, indicating that July will be a good domestic month. However, there is the drawback that the steam sizes from the Standard, Mt. Olive and southern Illinois fields must be disposed of. There was little change in prices, quotations being as follows: Standard lump, $1.65@$2; egg, $1.65@$1.75; nut, $1.50@$1.60; mine-run, $1.65@$1.75; screenings, $1@$1.25; Mt. Olive lump and egg, $2.10@$2.25; nut, $1.65@$2; mine-run, $1.75@$1.85, and screenings, $1.40@$1.50.

Coal shipments from the Duluth and Superior docks in June were about normal for the month, though dock operators were disappointed at the falling off in shipments, which were 13,500 cars as against 18,100 cars in May. Early buying in May, stimulated by discounts, was given as the reason. An advance,

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

		Week Ended—							
		June 1, 1929		June 8, 1929	June 15, 1929	June 22, 1929	June 29, 1929		
	Market Quoted	Independent	Company	Independent	Independent	Independent	Independent	Company	
Broken	New York	.....	$8.00@$8.10	.....	.....	.....	.....	$8.00@$8.10	
Broken	Philadelphia	$8.10@$8.20	8.10	$8.10@$8.20	$8.10@$8.20	$8.10@$8.20	$8.10@$8.20	8.10	
Egg	New York	8.00@ 8.10	8.30	8.05@ 8.30	8.05@ 8.30	8.05@ 8.30	8.05@ 8.30	8.30	
Egg	Philadelphia	8.30@ 8.55	8.30	8.30@ 8.55	8.30@ 8.55	8.30@ 8.55	8.30@ 8.55	8.30	
Egg	Chicago*	7.41	7.41	7.41	7.41	7.41	7.41	7.41	
Stove	New York	8.60@ 8.80	8.80	8.60@ 8.80	8.60@ 8.80	8.60@ 8.80	8.60@ 8.80	8.80	
Stove	Philadelphia	8.80@ 9.05	8.80	8.80@ 9.05	8.80@ 9.05	8.80@ 9.05	8.80@ 9.05	8.80	
Stove	Chicago*	7.86	7.86	7.86	7.86	7.86	7.86	7.86	
Chestnut	New York	8.10@ 8.30	8.30	8.05@ 8.30	8.05@ 8.30	8.05@ 8.30	8.05@ 8.30	8.30	
Chestnut	Philadelphia	8.30@ 8.55	8.30	8.30@ 8.55	8.30@ 8.55	8.30@ 8.55	8.30@ 8.55	8.30	
Chestnut	Chicago*	7.41	7.41	7.41	7.41	7.41	7.41	7.41	
Pea	New York	4.30@ 4.60	4.60	4.30@ 4.60	4.30@ 4.60	4.30@ 4.60	4.30@ 4.60	4.60	
Pea	Philadelphia	4.60@ 4.85	4.60	4.60@ 4.85	4.60@ 4.85	4.60@ 4.85	4.60@ 4.85	4.60	
Pea	Chicago*	4.11	4.11	4.11	4.11	4.11	4.11	4.11	
Buckwheat	New York	2.35@ 2.75	†2.75	2.35@ 2.75	2.35@ 2.75	2.30@ 2.75	2.50@ 2.75	†2.75	
Buckwheat	Philadelphia	2.75@ 3.00	2.75	2.75@ 3.00	2.75@ 3.00	2.75@ 3.00	2.75@ 3.00	2.75	
Rice	New York	1.75@ 2.00	2.00	1.75@ 2.00	1.75@ 2.00	1.60@ 1.85	1.60@ 1.85	2.00	
Rice	Philadelphia	2.00@ 2.25	2.00	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00	
Barley	New York	1.35@ 1.50	1.50	1.35@ 1.50	1.35@ 1.50	1.25@ 1.50	1.40@ 1.50	1.50	
Barley	Philadelphia	1.50@ 1.60	1.50	1.50@ 1.60	1.50@ 1.60	1.50@ 1.60	1.50@ 1.60	1.50	

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

averaging 10 and 15c. on prepared sizes, became effective June 1, and another of the same extent was scheduled for July 1. Coal continued to move from the Lake Erie ports in good volume. Forty to 50 cargoes per week were shipped and receipts at the docks in June were estimated to run close to the May figure of 2,653,206 tons. Liberal tonnages of Pittsburgh No. 8 coal are being received for the railroads in the Northwest and Pocahontas and other Southern coals are in increasing demand among the general consumers. Two cargoes of coke were brought from the East in the last month to supply an increasing demand.

JUNE 1 price schedules were as follows: Pocahontas lump, egg, stove and nut, $7.50; mine-run, $5; screenings, $4.10; Kentucky block, $6.50; lump, $6.25; egg and stove, $5.65; egg and dock-run, $5.40; screenings, $4.10; splint block, $5.50; lump and egg, $5.25; stove, $5; dock-run, $4.75; screenings, $3.85; Youghiogheny lump and egg, $5; stove, $4.75; dock-run, $4.60; screenings, $3.85; Hocking lump, $5; stove, $4.75; dock-run, $4.60, and screenings, $3.80.

Dullness featured the Southwestern market after June 1, when May storage prices were succeeded by the higher June schedule. Most of the mines are down for the season and little activity is expected for at least 30 days. June storage prices were as follows: Arkansas semi-anthracite, $4.25; Paris (Ark.) lump, $5; Spadra (Ark.) anthracite grate, furnace, egg and range, $5.50; Bernice (Ark.) grate $6.45; McAlester (Okla.) lump, $6; Wilburton (Okla.) lump, $5.25; Henryetta (Okla.) lump, $3.50@$3.75, and Tulsa (Okla.) lump, $3@$3.25.

Little change appeared in the Colorado market during June. Orders for storage coal were scarce and dealers deferred buying in anticipation of future lower prices. The demand for steam sizes continued good throughout the month, but prepared sizes, on the contrary, moved slowly. Prevailing prices were as follows: Walsenburg-Canon City lump, $4.55; nut, $4.30; washed chestnut, $2.25; Trinidad coking lump, nut and chestnut, $2.95; Crested Butte bituminous lump, $4.55; nut, $4.30; Crested Butte anthracite furnace and egg, $7.75; Rock Springs-Kemmerer lump, $4; nut, $3.75; steam sizes, $1.50; Colorado steam sizes, $1.40.

BUSINESS in the Louisville market improved somewhat during June and a note of optimism prevailed toward the future. Inquiries were received in greater number and many orders were placed by state, municipal and railroad users of steam coal. A few western Kentucky mines maintained good operating schedules on the basis of lake contracts but the lake business in eastern Kentucky was much below normal, as a result, it is said, of unfavorable competitive conditions. The large captive mines in the eastern part also operated near full time and western Kentucky reported some improvement in prepared sizes, chiefly on nut destined for Southern consumption. Screenings were kept out of the way at 75c.@$1 in both fields. July and August stocking, it is felt, should result in an improved demand and utility and industrial buying for current consumption has been good.

Prices remained unsatisfactory. Harlan mines are considering pricing block at $2.25 in July. Lump and egg were quoted at $1.60 up; nut at $1.50 up; mine-run, $1.30@$1.65, and screenings, 75c.@$1.10. Some premium coals were priced a little better. Western Kentucky sold prepared sizes at $1.15@$1.50, with some 6-in. block at $1.25; mine-run, 90c. up, and screenings, 75c. up. Steam prices were firm but the demand for prepared sizes was slack and prices were low in sympathy.

Though there is a disposition to bewail the state of the coal business in the Cincinnati market, it has been worse in other years. Retailers are the only class of buyers who have failed to take part in the trade, due, they state, to failure to collect last year's bills. The lake business has outstripped that for the past four or five years, though prices were not as high as many would have liked. This year the L. & N. shippers are getting an even break with those on the C. & O. and 12,000 to 13,000 cars moved through the Cincinnati gateway each week. Steel mills and public utilities readily absorbed slack and consequently the price was maintained.

Smokeless dealers had hoped to sell at an advance over the circular price during the month of June, and some did receive $3 for lump and egg. However, the July circular has gone out at $2.75 when it was hoped to raise it to $3. Stove and nut sizes were inactive and mine-run was spotty and variable in price. Slack was firmer, reflecting buying by steel and coking interests. The high-volatile trade was in much the same state as the smokeless, the one bright spot being the recession in production and the wiping out of the distress tonnage in egg. Mine-run was sluggish, with few inquiries. Retailers held to the prices fixed April 1, but at the last of the month many of the key companies took advertising space to announce the following increases on July 1: Smokeless lump, $8; mine-run, $6, and bituminous lump and slack, $4.50.

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

		Week Ended				
	Market Quoted	June 1, 1929	June 8, 1929	June 15, 1929	June 22, 1929	June 29, 1929
LOW-VOLATILE, EASTERN						
Smokeless lump	Columbus	$2.40@$2.75	$2.40@$2.75	$2.50@$2.85	$2.50@$2.85	$2.50@$3.00
Smokeless mine-run	Columbus	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Smokeless screenings	Columbus	1.15@ 1.35	1.15@ 1.35	1.15@ 1.35	1.15@ 1.35	1.15@ 1.35
Smokeless lump	Chicago	2.50@ 3.00	2.25@ 3.00	2.25@ 3.00	2.25@ 3.00	2.25@ 3.00
Smokeless mine-run	Chicago	1.85@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Smokeless lump	Cincinnati	2.50@ 2.75	2.50@ 3.00	2.65@ 3.00	2.50@ 3.00	2.50@ 3.00
Smokeless mine-run	Cincinnati	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Smokeless screenings	Cincinnati	1.10@ 1.25	1.25@ 1.35	1.25@ 1.35	1.25@ 1.35	1.25@ 1.35
*Smokeless mine-run	Boston	4.15@ 4.30	4.10@ 4.25	4.10@ 4.25	4.10@ 4.25	4.15@ 4.25
Clearfield mine-run	Boston	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
Cambria mine-run	Boston	1.70@ 2.00	1.70@ 2.00	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00
Somerset mine-run	Boston	1.60@ 1.85	1.60@ 1.85	1.50@ 1.80	1.50@ 1.80	1.50@ 1.80
Pool 1 (Navy standard)	New York	2.20@ 2.40	2.00@ 2.40	2.00@ 2.40	1.95@ 2.40	1.95@ 2.40
Pool 1 (Navy standard)	Philadelphia	2.20@ 2.40	2.15@ 2.30	2.25@ 2.60	2.25@ 2.60	2.25@ 2.60
Pool 9 (super low. vol.)	New York	1.70@ 1.90	1.75@ 1.90	1.75@ 1.90	1.70@ 1.90	1.70@ 1.90
Pool 9 (super. low. vol.)	Philadelphia	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
Pool 10 (h. gr. low. vol.)	New York	1.50@ 1.75	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80
Pool 10 (h. gr. low. vol.)	Philadelphia	1.65@ 1.80	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75
Pool 11 (low. vol.)	New York	1.30@ 1.50	1.30@ 1.50	1.30@ 1.50	1.35@ 1.40	1.40@ 1.50
Pool 11 (low vol.)	Philadelphia	1.45@ 1.65	1.45@ 1.65	1.45@ 1.65	1.45@ 1.65	1.45@ 1.65
HIGH-VOLATILE, EASTERN						
Pool 54-64 (gas and st.)	New York	$1.25@$1.40	$1.25@$1.40	$1.25@$1.40	$1.25@$1.40	$1.25@$1.40
Pool 54-64 (gas and st.)	Philadelphia	1.15@ 1.40	1.15@ 1.40	1.15@ 1.40	1.15@ 1.40	1.15@ 1.40
Pittsburgh sc'd gas	Pittsburgh	1.85@ 2.00	1.90@ 2.00	1.90@ 2.00	1.90@ 2.00	1.90@ 2.00
Pittsburgh gas mine-run	Pittsburgh	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75
Pittsburgh mine-run	Pittsburgh	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75	1.40@ 1.75
Pittsburgh slack	Pittsburgh	1.00@ 1.15	1.00@ 1.10	1.00@ 1.10	1.00@ 1.10	1.00@ 1.10
Kanawha lump	Columbus	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00
Kanawha mine-run	Columbus	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50	1.25@ 1.50
Kanawha screenings	Columbus	.90@ 1.10	.90@ 1.10	.85@ 1.10	.85@ 1.10	.90@ 1.15
W. Va. lump	Cincinnati	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00
W. Va. gas mine-run	Cincinnati	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50
W. Va. steam mine-run	Cincinnati	1.10@ 1.35	1.10@ 1.35	1.15@ 1.35	1.15@ 1.35	1.20@ 1.40
W. Va. screenings	Cincinnati	.75@ 1.10	.75@ 1.00	.85@ 1.00	.85@ 1.00	.85@ 1.10
Hocking lump	Columbus	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00	1.65@ 2.00
Hocking mine-run	Columbus	1.35@ 1.55	1.35@ 1.55	1.35@ 1.55	1.35@ 1.55	1.35@ 1.60
Hocking screenings	Columbus	1.10@ 1.25	1.10@ 1.25	1.10@ 1.25	1.10@ 1.25	1.10@ 1.25

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

A SLIGHT increase in the demand for domestic sizes, dating from the middle of June, gave a better tone to the Columbus trade. Dealers report a fair amount of stocking business, though the real movement is not expected until July. Little replenishing has been done since the regular season and many retailers carried over heavy supplies from March as a result of warm weather. Retail prices for July are as follows: smokeless lump and egg, $7.75; stove, $6.50; splints and Kentucky block, $6.25@$6.75, and Hocking lump, $5.25. These prices are subject to a discount of 50c. per ton if bills are paid in 30 days.

The steam trade remained quiet, with little hope of activity in the near future. Some railroad tonnage was contracted at $1.75, and a number of utilities placed orders. Industrial users still

pursued their policy of buying a part of their requirements on the open market. Screenings were steady at 60c.@$1, depending upon variety. Ohio screenings sold at $1@$1.25. The lake trade was rather brisk and some Hocking operators secured lump and mine-run contracts, which they hail as a re-entry into the Northwest. Wholesale prices were steady, with Hocking and Pomeroy lump selling at $1.35@$1.60; mine-run, $1.35@$1.60, and screenings $1.10@$1.25.

Prospects in the Pittsburgh market appeared somewhat brighter in the closing weeks of the month, when a number of inquiries opened up possibilities of sales. Railroads came into the market for tonnages and industrial users seemed more interested. At the same time a demand for steam slack, stimulated by the curtailment of the lump production, made its appearance in the lake trade and retailers became interested in domestic sizes, ostensibly for autumn shipment at present prices. These developments, however, were not sufficient to cause any improvement in quotations. Other than producers having their own docks, the lake season has brought little business to the Pittsburgh region, and the district is committed to the belief that there will be little or no opening in that direction for the rest of the season.

Indications are that the central Pennsylvania trade will pick up in the future. Orders came in more freely in the last month, though the increase has not yet had time to be reflected in the production, which was slightly less than in May. Neither did the increase change prices, which remained substantially at their former level.

A FIRM tone pervaded the steam coal market in New England in the month of June though there was little change in prices from May. Output was better controlled, however, and the smaller manufacturers, who usually buy during the summer, have begun to place orders for fall and winter fuel supplies. In the aggregate, considerable tonnage was engaged for July and August delivery. Bids for the New Haven R. R. supply were opened June 24, but contracts have not yet been awarded. Two New England shippers submitted prices of $4.72 and $4.79 on coals analyzing 34 to 36 per cent volatile matter, alongside the docks at Boston.

At the Virginia terminals high-grade mine-run sold at $4.15@$4.25 f.o.b. vessel and only occasionally was a price of $4.10 reported. On cars at Boston for inland delivery the price was $5.40@$5.50, although there were a few sales at $5.25@$5.35 for second grades or coal with a large percentage of nut and slack. Nut and slack remained firm at $5. At Providence, however, as an aftermath of keen competition, good mine-run could be had at $5.10.

Quietness featured the New York market in the month of June. Spot coal was inactive but contractors took a good volume throughout the month, with some few asking for delayed shipments. Low reserves created a spirit of optimism and many consumers stated that they would be in the market for coal the latter part of August or early in September. Prices showed little variation throughout the month.

A continued increase in production was a source of satisfaction to the Philadelphia market in June. Ordinarily the upward movement takes place after July 4, but this year it has been a few weeks early, leading many to infer that industrial plants are ordering in larger quantities to replenish reserves, which were never heavy during the year. Generally good industrial conditions have helped but whether the larger users will feel sufficiently encouraged to build up storage stocks remains a question. However, good buying to supply current needs seems assured for the rest of the summer. Slack, while scarce as a result of heavy movement to the lakes, may still be obtained in such volume as to prohibit anything but a moderate strengthening in the price.

THE Birmingham market showed few signs of life in June. The demand for all grades of steam coal was comparatively light and the volume abnormally small as compared with the same month a year ago. Consumers bought only as necessary and practically no stocks were carried by industrial users or railroads. Coking plants operated at the normal rate but bunkering demand was practically non-existent. Quotations were as follows: Big Seam and Carbon Hill mine-run and washed, $1.50@$1.75; Cahaba mine-run and washed, $1.75@$2; Black Creek washed, $2; Corona mine-run, $1.90, washed, $2.15.

Unusual effort was required to move the limited quantity of domestic coal sold in June, as the volume of business booked was far from adequate to absorb the production. The necessity of disposing of the surplus resulted in some defections from the schedule. July business in sight shows no improvement over June and credit conditions are held to account for the limited contracting. July prices are as follows: Black Creek lump, $4@$4.25; egg, $4@$4.10; nut, $3.20; Cahaba lump, $3.60@$4.60; egg, $3.60@$4.35; nut, $2.95@$3.20; Corona lump, $2.95; egg, $2.80; nut, $2.55; Big Seam lump and egg, $2.05; nut, $1.95; Carbon Hill lump and egg, $2.55; nut, $2.10@$2.30; Montevallo lump, $4.60@$5.35; egg, $4.35@$5.35; nut, $2.95@$3.50.

June buying in the New York anthracite market, while not heavy, was sufficient to absorb production and a fair volume was moved throughout the month. Steam sizes remained in uniformly good condition. Mine prices on domestic sizes were advanced only 5c. on June 1, as a result of the repeal of the anthracite tonnage tax.

The Philadelphia anthracite market still is experiencing difficulty in getting under way. Little retail activity is expected until fall and advancing prices bring thoughts of fuel to the householder. The credit situation still operates against dealer purchases and yard stocks are low as compared to other years. Little stocking is expected until fall. Curtailed production eliminated the surplus of all sizes usually present in June and prices continued firm.

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

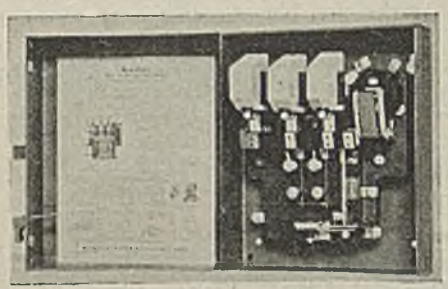
		Week Ended—				
MIDDLE WEST	Market Quoted	June 1, 1929	June 8, 1929	June 15, 1929	June 22, 1929	June 29, 1929
Franklin, Ill. lump	Chicago	$2.55	$2.55	$2.55	$2.55	$2.55
Franklin, Ill. mine-run	Chicago	2.15	2.15	2.15	2.15	2.15
Franklin, Ill. screenings	Chicago	1.75@ 1.85	1.75@ 1.85	1.75@ 1.85	1.75@ 1.85	1.75@ 1.85
Central, Ill. lump	Chicago	2.05@ 2.20	2.05@ 2.20	2.05@ 2.20	2.05@ 2.20	2.05@ 2.20
Central, Ill. mine-run	Chicago	1.70@ 1.80	1.70@ 1.80	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85
Central, Ill. screenings	Chicago	1.40@ 1.50	1.40@ 1.50	1.40@ 1.50	1.40@ 1.50	1.40@ 1.50
Ind. 4th vein lump	Chicago	2.25@ 2.55	2.25@ 2.55	2.25@ 2.55	2.25@ 2.55	2.25@ 2.55
Ind. 4th vein mine-run	Chicago	1.50@ 1.90	1.50@ 1.90	1.50@ 1.90	1.50@ 1.90	1.50@ 1.90
Ind. 4th vein screenings	Chicago	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
Ind. 5th vein lump	Chicago	2.00@ 2.15	2.00@ 2.15	2.00@ 2.15	2.00@ 2.15	2.00@ 2.15
Ind. 5th vein mine-run	Chicago	1.10@ 1.75	1.00@ 1.75	1.00@ 1.75	1.00@ 1.75	.90@ 1.75
Ind. 5th vein screenings	Chicago	1.10@ 1.35	1.10@ 1.35	1.00@ 1.25	1.00@ 1.25	.90@ 1.20
Mount Olive lump	St. Louis	2.10@ 2.25	2.20@ 2.25	2.10@ 2.25	2.10@ 2.25	2.10@ 2.25
Mount Olive mine-run	St. Louis	1.75@ 1.85	1.75@ 1.85	1.75@ 1.85	1.75@ 1.85	1.75@ 1.85
Mount Olive screenings	St. Louis	1.40@ 1.50	1.40@ 1.50	1.40@ 1.50	1.40@ 1.50	1.40@ 1.50
Standard lump	St. Louis	1.85@ 2.00	1.85@ 2.00	1.85@ 2.00	1.85@ 2.00	1.85@ 2.00
Standard mine-run	St. Louis	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75
Standard screenings	St. Louis	1.15@ 1.25	1.15@ 1.25	1.15@ 1.25	1.00@ 1.10	1.00@ 1.10
West Ky. block	Louisville	1.25@ 1.40	1.25@ 1.40	1.25@ 1.40	1.25@ 1.50	1.25@ 1.50
West Ky. mine-run	Louisville	.90@ 1.30	.90@ 1.30	.90@ 1.30	.90@ 1.25	.90@ 1.25
West Ky. screenings	Louisville	.75@ 1.00	.75@ 1.10	.75@ 1.10	.75@ 1.10	.75@ 1.10
West Ky. block	Chicago	1.15@ 1.40	1.15@ 1.40	1.15@ 1.40	1.15@ 1.40	1.15@ 1.40
West Ky. mine-run	Chicago	.90@ 1.30	.90@ 1.30	.90@ 1.30	.80@ 1.25	.80@ 1.25
SOUTH AND SOUTHWEST						
Big Seam lump	Birmingham	$2.05	$2.05	$2.05	$2.05	$2.05
Big Seam mine-run	Birmingham	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
Big Seam (washed)	Birmingham	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
S. E. Ky. block	Chicago	1.75@ 2.10	1.75@ 2.10	1.75@ 2.10	1.75@ 2.10	1.75@ 2.10
S. E. Ky. mine-run	Chicago	1.35@ 1.65	1.35@ 1.65	1.35@ 1.65	1.35@ 1.65	1.35@ 1.65
S. E. Ky. block	Louisville	1.75@ 2.10	1.75@ 2.10	1.75@ 2.10	1.75@ 2.10	1.75@ 2.10
S. E. Ky. mine-run	Louisville	1.30@ 1.65	1.30@ 1.65	1.35@ 1.60	1.30@ 1.65	1.30@ 1.65
S. E. Ky. screenings	Louisville	.90@ 1.10	.90@ 1.10	.85@ 1.10	.85@ 1.10	.75@ 1.10
S. E. Ky. block	Cincinnati	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00	1.75@ 2.00
S. E. Ky. mine-run	Cincinnati	1.10@ 1.50	1.10@ 1.50	1.15@ 1.50	1.20@ 1.50	1.15@ 1.50
S. E. Ky. screenings	Cincinnati	.75@ 1.10	.75@ 1.10	.85@ 1.10	.85@ 1.00	.85@ 1.10
Kansas shaft lump	Kansas City	3.50@ 4.00	3.50@ 4.00	3.50@ 4.00	3.50@ 4.00	3.50@ 4.00
Kansas strip lump	Kansas City	2.50	2.50	2.50	2.50	2.50
Kansas mine-run	Kansas City	2.50	2.50	2.50	2.50	2.50
Kansas crushed mine-run	Kansas City	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25

WHAT'S NEW

In Coal-Mining Equipment

Electrical Equipment Developed

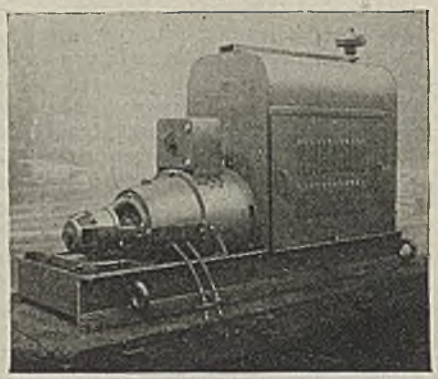
Increased safety, economy and rating on class 11-200 line starters result from the use of "Deion" contactors, according to the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. They are said to confine, divide and smother the arc quickly and to increase the safety of the operator. A smaller inclosure, with consequent decrease in the size of the starter, also is permitted and the arc is said to be ruptured so fast, with so little fire, that contact and arc chute life are materially increased. The Westinghouse company guarantees these contacts to rupture from twelve to sixteen times their normal current-carrying capacity at rated voltage under the most severe operating conditions of low power factor and sustained voltage.



Westinghouse Line Starter with "Deion" Contactors

The Westinghouse company also announces the development of a drum-type controller for across-the-line starting of small d.-c. motors. The controller is provided with fuses mounted inside the controller case and interlocked with a screw-type cover to meet the requirements of the U. S. Bureau of Mines for explosion-tested equipment. Accessibility is said to be one of the features and is provided for by mounting the entire controller on the bottom base. The controller is designed as a small, compact unit for application on permissible-type conveyors, pit-car loaders, room hoists, small pumps and similar apparatus where explosion-tested equipment is desired.

An additional item of electrical equipment recently placed on the market is a 300-amp. gas-engine-driven single-operator arc-welding set for use in pipe-line and storage-tank construction, steam



Arc-Welding Set for Use Where Power Is Not Available

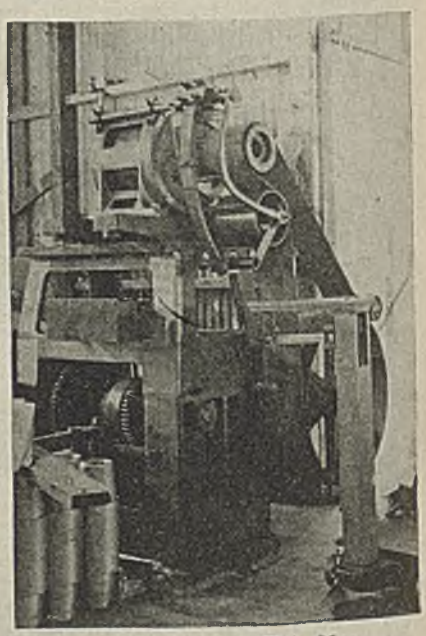
railroad construction and maintenance, structural steel work and general construction and repair jobs in isolated places where local power is not available. The complete set consists of a model P-35 Continental 4-cylinder gas engine direct-connected to a Westinghouse 300-amp. single-operator type SK arc-welding generator, with flexibly coupled exciter overhung from the generator bracket. The welding current is varied over the entire range by means of a single-dial rheostat. Simplified control and efficient operation are said to result from separate excitation. The complete equipment is as compact as possible, according to the manufacturer, and is equipped with protective covers permitting operation in all weather without the necessity of a canopy. It may be made portable by adding running gear parts.

Eliminates Hand Maul In Excavating

A sheeting driver, known as the CP-116, which is designed to drive wooden sheeting and also light steel sheet piling has been added to the line of the Chicago Pneumatic Tool Co., New York City. This device drives sheeting successfully in the making of trenches and other excavations in formations such as clay, sand and gravel. The driver, which is pneumatic and valveless, is said to require little air, to be non-freezing and to do the work of eight or ten men with mauls. In the main this driver is identical with the CO-116 demolition tool, to which it may be converted by changing the front-end fittings.

Beltslacker Designed To Eliminate Slip

Two devices for driving slack belts, which are claimed to eliminate slippage without use of "dope," are offered as new equipment by Harry M. Perry, 638 North Main St., Los Angeles, Calif.

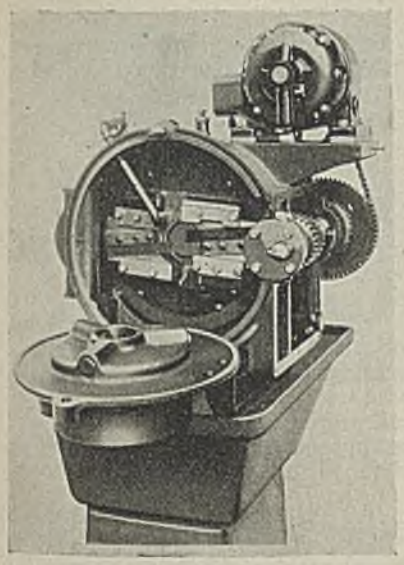


Cantilever Belt Take-Up

One is intended for vertical drives and depends upon adjustable tension of a centilever spring of one or more leaves. As the spring tension decreases the belt wrap increases. The other is the down-tension type for use on belts having the pull on top. Tension is created on this type by adjustable tension reels. Both are mounted on Timken roller bearings and can be swung to any desired position by rotation on a hinge bar.

Bars and Pipe Handled By Cutting-Off Tool

The Oster Mfg. Co., Cleveland, Ohio, recently placed on the market a revolving-head, blade-type cutting-off machine for bar stock and pipe. Minimum weight, power and floor space requirements and absence of severe whipping of the stock are some of the advantages



Cutting-Off Machine Showing Revolving Head and Drive

claimed. Simplicity and ruggedness of design are stressed. The capacity of the machine is $\frac{3}{8}$ in. to 2 in. solid stock and $\frac{1}{4}$ in. to $1\frac{1}{2}$ in. pipe or tubing. It is powered with a universal motor operating from a light socket or permanent wiring on 110 volts, single-phase, 25- to 60-cycle alternating current or 110 volts direct current. A silent-chain drive operates off a jackshaft mounted in Timken roller bearings.

Equipment Supplements Conveyor Operation

New Vulcan developments, which include the swinging discharge chute, swinging joints and the extensible chute and shoveler, are offered by the Vulcan Iron Works, Wilkes-Barre, Pa., to improve the performance of the Vulcan shaking conveyor. The extensible chute and shoveler, according to the company, provide a simple and effective means of extending the shaking conveyor chute which, equipped with a set of swinging joints permitting it to be swung from side to side, allows large areas to be rapidly cleaned up. It is no wider than the standard chute section, can be attached without special connections and is said to be light and easy to move, strong yet able to slip when obstructions are struck, and to be easily detached by merely running it off the end. When worn out, the maker states that it may be detached by removing four bolts and discarded without great capital loss.

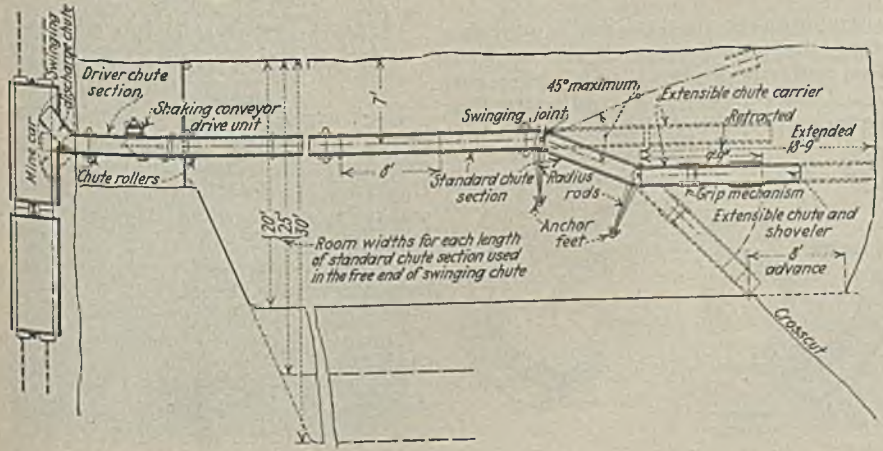
The 45-deg. swinging joints (see accompanying illustration) can easily be attached to the standard chute section, according to the maker, and allow the conveyor to be flexed at any part of its length.

Movement through an arc of 180 deg. is possible with the swinging discharge chute which, when attached to the standard Vulcan conveyor, is said to eliminate the necessity of moving the car while loading it. The chute is moved from side to side to fill the car and when not in use is swung to one side out of the way. The chute is provided with handles to direct the discharge and the manufacturer claims that it provides an ideal method of distributing the coal in the car.

Vulcan Two-Ton Battery Locomotive

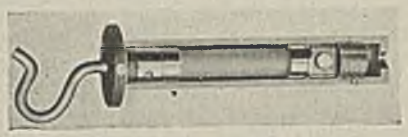
An additional item of coal-mine equipment recently developed by the Vulcan company is the storage-battery locomotive shown in the accompanying figure. The weight of the locomotive is two tons.

Shaking Chute Conveyor Application Showing Swinging Extensible Shoveler, Swinging Joint and Swinging Discharge Chute



Fused Type Trolley Tap For Mine Use

A fused trolley tap that provides a means for connecting a trailing cable to portable machines in mines, is announced as a new product of the Ohio Brass Co., Mansfield, Ohio. Claims are made that, being fused, the tap protects



Form 3 Trolley Tap

motors and cables against burnouts from overloading and safeguards lives of men from gas ignition. The maker states the fuse is replaceable without pliers or screw-driver. Fuse case is of phenol canvas and joined internally to contacts in a canvas-to-metal threading. The tap is furnished in two types, one for hooking and the other for clamping to 1- to 6-0 grooved and Fig. 8 wires, also to Roebling special No. 9.

New Features Claimed For Oil Switches

Oil switches and a new pyrometer are among recent products announced by the Roller-Smith Co., New York. The oil switches, designated as type "O," are made in capacities of 200 to 2,000 amp., from 2,500 to 15,000 volts and with interrupting capacities of from 20,000 to 40,000 kva. They may be obtained as two- or three-pole devices, automatic and non-automatic, single- or double-throw and for switchboard, wall or cell mounting. Hand operation, normal or remote control and electrical operation are other features which may be had. All the necessary styles of trips and all the usual auxiliaries required in oil-switch operation are available.

Outstanding characteristics claimed for the new line include continuous laminated conductor from terminal to moving member; moving, self-aligning contact of drawn copper; arcing tips of large copper volume designed to utilize electro-magnetic stresses to increase contact pressure; complete inclosure and straight-line construction; rigidly clamped conductors set in heavy wet-process porcelain insulators; frame consisting of a heavy casting internally ribbed and dome shaped for strength; heavy welded tank; double-flanged tank seat to permit free venting and reduce oil throw; wooden one-piece contact rod of specially treated material; tank lining of material designed to resist burning by the arc, and greater gas and oil expansion volumes.

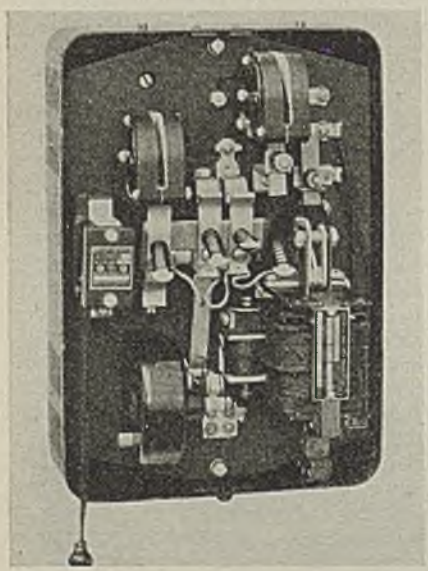
The new pyrometer, designated as type FD, is part of an outfit which includes the pyrometer, a thermocouple and leads. The specific application is

in the indication of the temperature of molten type metal as used with the various kinds of type-casting machines.

More Accelerating Points On D.C. *Motor Starters*

A complete new line of direct-current motor starters for general-purpose applications has been introduced by the General Electric Co. These starters are designed to provide definite-time acceleration for constant- and adjustable-speed motors, and are divided into five types bearing the designations CR-4065, CR-4066, CR-4166, CR-4068 and CR-4168.

One of the principal advantages of the new design is the fact that, despite a reduction in size, the number of accelerating points has been increased. Improved appearance is obtained by the use of drawn-shell inclosing cases.



Automatic Starter with Cover Off

The CR-4065 starter is a constant-speed type for general-purpose applications, and the CR-4066 is the same type with the addition of dynamic braking. The CR-4166 is an adjustable-speed type with dynamic braking and full-field features. The CR-4068 is a constant-speed type, reversing, with dynamic braking. The CR-4168 is an adjustable-speed type, reversing, with dynamic braking and full-field features.

Portable Electric Hand Saw

An electric hand saw, in sizes accommodating 6-, 8- or 10-in. diameter cutting disks, which, it is said, is light in weight and will cross-cut and rip lumber up to 3½ in. thick, is now offered by the Black & Decker Mfg. Co., Towson, Md. A special saw disk for cutting light-gage metal and another of the abrasive type for cutting slate and similar substances are optional accessories.

For Wood, Metal and Non-Metallics

The unit has telescopic guards which function automatically to cover that portion of the blade not in the work. It incorporates an adjustable shoe by which the depth or angle of cut may be regulated. The saw is furnished for d.c. or a.c. operation on 32, 116, 220 or 250 volts, designed with a pistol grip and trigger switch. Gears and shafts of chrome nickel run in grease. Full ball bearings and air cooling allow continuous operation without overheating, it is claimed.

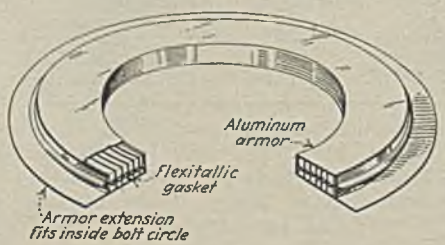
Quiet Operation Claimed For New Motor

The Wagner Electric Corporation has recently developed an ultra-quiet motor —type RAR—especially for use in homes, schools and churches. The motor proper is insulated from the supporting base by rubber bushings which absorb the vibration. Despite the use of rubber, the maker asserts that the outfit is practically rigid and that shaft alignment is not endangered. The motor is of the brush-lifting type and the weights have been equipped with rubber bumpers. The rocker arm has been redesigned, it is stated, to practically eliminate noise during starting and stopping. Better distribution of material is said to give better power factor and efficiency.

Gaskets Said to Stand Severe Usage

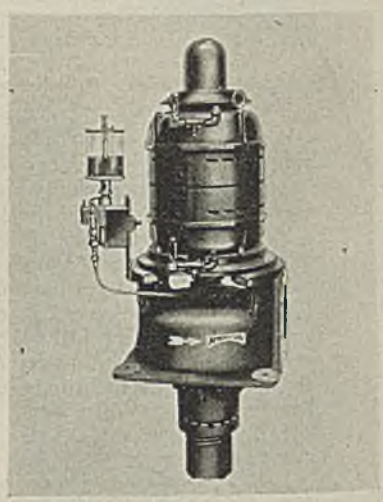
An armored gasket said to withstand the most severe conditions has been perfected by the Flexitallic Gasket Co., Camden, N. J. According to the manufacturer, the gasket, known as the "Armor-Clad Flexitallic," is not affected by high pressures or temperatures, acid conditions or condensation; maintains its flexibility indefinitely and is easy to install.

Details of Armored Gasket



Deep-Well Turbine Made For Small Wells

The American Well Works, Aurora, Ill., now offers new 6- and 8-in. deep-well turbines, built in response to a demand for turbines to fit the smaller bored wells. They consist of the turbine head proper, which is the driving unit; the supporting pipe, which incloses the driving shaft, and the turbine itself with the number of stages necessary for the specific requirements. The turbine itself is of the centrifugal type especially designed for deep-well work. All bearings are oiled by an electrically controlled gravity feed from the surface. Provision is made for complete drainage of all waste oil and water leakage and the discharge pipe is located above the floor level to promote ease of access.

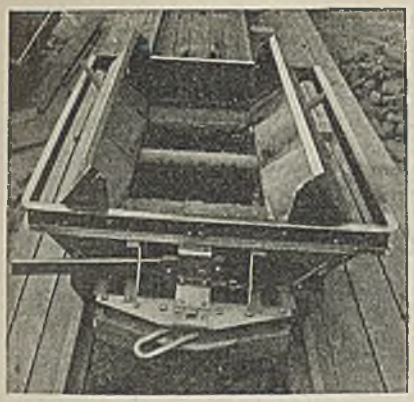


American Well Works Deep-Well Turbine

Mine Car Now Designed For High Capacity

High capacity has been sought in the design of the new "Double Automatic" mine car manufactured by the Sanford-Day Iron Works, Knoxville, Tenn. Its construction, shown in the accompanying illustration, eliminates the usual flare and sloping sides which were a part of other types of bottom-dumping mine cars. Instead, the bottom is flat all the way across to obtain additional capacity.

Discharge is accomplished by placing the side sections, extending out over the wheels, on hinges attached to the truck



"Double Automatic" Bottom-Dumping Mine Car, Showing Hinged Sides Raised to Discharge Material

frame channel. In operation, the bottom doors are first released, and then, as the car moves a little further along, a device at the side of the track tilts the side sections of the car to the proper angle for the discharge of the material. The wheels cut through that section of the lading bottom which extends out beyond the width of the track, and hoods, or shrouds, are provided to close these openings. This construction is said to give the maximum capacity.

Efficiency Claimed for New Polyp Bucket

A radical departure from hitherto known designs of buckets is represented by the Polyp bucket, manufactured by Reichmann-Becker Polyp Co., Duisburg, Germany. As shown in the accompanying illustration, the Polyp may be termed a multiple flexible-blade bucket,

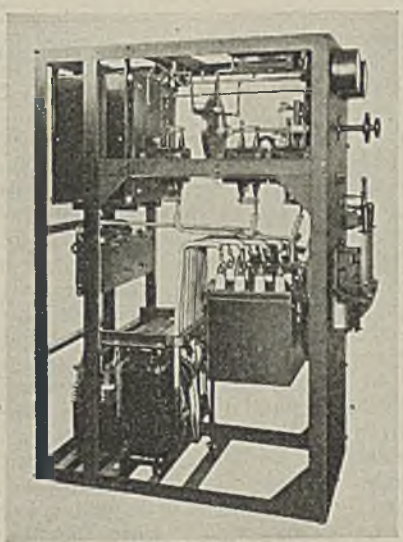
The Polyp Bucket at Work

the blades operating independently. According to the company, the blades adjust themselves to the material to be handled and dig themselves in like so many fingers of a hand.

The Polyp is built in two types. The open type, with eight blades, is used for handling steel scrap of every kind and similar material, while the closed type is designed for handling coal, coke, gravel, sand, ore, etc. One of the principal advantages claimed is that the Polyp will be 100 per cent loaded with each lift, which results in a greatly increased efficiency of the plant, as less labor need be employed and the material will be handled in a much shorter time. The bucket may be obtained in all sizes up to a capacity of 20 cu.yd.

Dead-Front Cubicles Meet Shovel Requirements

The safety inclosed dead-front cubicle has been applied recently to control the synchronous motor-generator set supplying the power on electric shovels, according to G. H. Kohn, switchgear



Safety Inclosed Stationary-Type Panel, 2300/3810 Volts

department, General Electric Co. This supersedes the open-frame construction and has no better application than on the restricted deck of a shovel that is subject to excessive vibration and a constant accumulation of dust.

This construction not only affords a mounting and compact arrangement for the auto-transformer, motor and exciter field rheostats, oil circuit breaker, instrument transformers, etc., but also has the advantage of safety to personnel and of the so-called "factory built complete equipment" that is steadily gaining in popularity. The installation work on such a unit is reduced to its simplest form, necessitating only bolting to the floor or deck and connecting the primary cables.

In order to provide greater flexibility and a wider range of operation, the auto-transformer and instrument transformers are wound for double primary voltage. The equipment also includes necessary primary cutouts for protecting an auxiliary transformer used for lighting the cabin of the shovel.

Standard units are rated 2,200/3,810 volts, 3 phase, 3 wire, 60 cycles, 190 to 800 kva. inclusive. Two sizes of units cover all capacities involved. The largest capacity unit—namely, 800 kva.—permits the excavation of 12 cu.yd. of material in one lift. With modifications to the apparatus this unit also may be used for motor starting equipments or for pumps, compressors and similar applications.

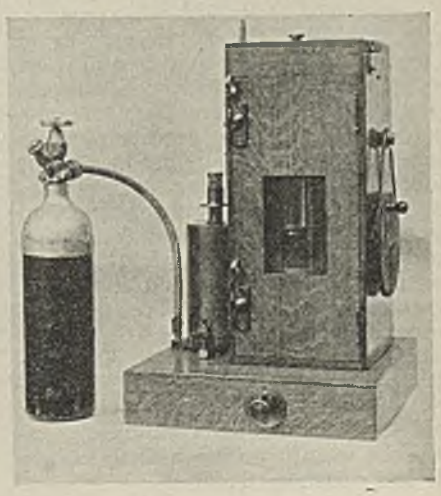
Wire Stripper Announced

Triple action in which the wire is clamped, the insulation cut and the stripping automatically timed and performed with one squeeze of the handles is the principal feature claimed for the new "E-Z" wire stripper announced by the Ideal Commutator Dresser Co., Sycamore, Ill. The company also asserts that the wires are not nicked, the operator's hands are protected and that waste of wire is prevented. It is recommended for use by electricians, maintenance men and building engineers.

Safety Lamps Tested In New Cabinet

A new testing device, the McCaa lamp testing cabinet, is now being offered by the Mine Safety Appliances Co., Pittsburgh, Pa. This cabinet is for use in determining the sensitiveness of various types of flame safety lamps to the presence of gas, as well as defects in the assembly of the lamp. It is recommended by the company as an especially valuable piece of equipment for mine foremen and firebosses.

McCaa Lamp Testing Cabinet

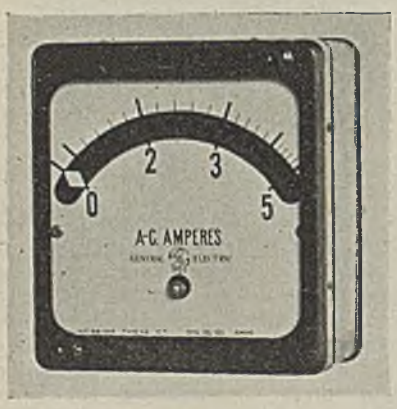


The lamp to be tested is placed unlighted in the explosion chamber. Butane gas is introduced into the explosion chamber by a system of petcocks, tubes and a measuring device. The igniter is then operated and the action of the lamp will indicate whether or not it is safe to use. Sensitiveness of lamps to different percentages of gas is easily determined, the company states. The lighted lamp is placed in the chamber, a known quantity of gas introduced and the height of the cap observed.

The manufacturer states that the cabinet should be invaluable to mining schools and coal companies who wish to teach the theory and practice of testing for gas with a flame safety lamp. It also enables a lamp-service man to determine whether a lamp is safe to use in a gaseous mine.

Electrical Aids Offered

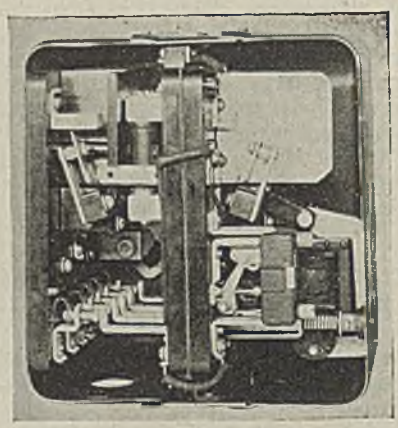
New products developed by the General Electric Co., Schenectady, N. Y., include a pressure governor, immersion-type heaters with protected terminals, "non-glare" glass for instruments, a switch for general-purpose use and a metal melting pot with bottom-pouring spout. The changes in the pressure governor are said to result in improved appearance, greater strength, simplification and improved electrical design. In this governor—CR-2922—the impulse-type relay has been replaced by a potential relay; the contact and gage mechanism has been made more rugged; special provisions have been incorporated to prevent the gage mechanism from getting out of alignment, and the Bourdon tubes, indicating up to 300 lb., are mounted two in parallel, one actuating the needle and the other the contact mechanism. This, it is claimed, insures accuracy in operation and indication. Another improvement allows the incorporation of gages up to 10,000 lb.



Type AD Switchboard Ammeter

Sealed terminals and porcelain insulating bushings are features of the electric immersion-type heaters. These are said to make the units practically impervious to injury from moisture in the air and splashing liquids.

Special "non-glare" glass, in combination with anti-parallax scales and pointers, is claimed to make the new line of switchboard instruments easy to read from practically any angle. The instruments are uniform in size and appearance in both the a.-c. (type AD) and d.-c. (type DD) ammeters, voltmeters, wattmeters, reactive volt-ampere meters, power-factor meters and frequency meters and may be obtained in standard commercial frequencies with special ratings and dial markings if desired.



CR-7006-F-1 Magnetic Switch, Showing Motor-Circuit Switch Open

The instruments are 6 in. long, 5½ in. wide and 3½ in. deep, making it possible, according to the manufacturer, to economize space by mounting four instruments in a row across a 24-in. switchboard. Voltmeters, wattmeters, power-factor meters and reactive volt-ampere meters have the resistors inclosed in the case with the exception of the wattmeters for voltages in excess of 140, which have external resistors. Both the a.-c. and d.-c. instruments have electromagnetic damping.

Magnetic switches, motor circuit switches and inclosed fuses usually required in the control of a motor are said to be unnecessary when the new CR-7006-F-1 switch is installed. This switch, it is said, can be applied to control any motor where a general-purpose magnetic switch should be used and where its special features are desirable. It consists of a back portion containing a motor circuit switch, a middle portion containing the magnetic switch and the fuses and the front cover. Overload protection is provided by two temperature relays. The switch also is furnished with a holding interlock which permits its use with a "start-stop" momentary-contact pushbutton station. When such a station is used it is necessary to press the "start" button to start the motor.

Advantages claimed are that it combines three functions at no greater cost; instant replacement is possible; removal and replacement can be accomplished with safety, and that the motor circuit switch will handle the stalled motor current and can be opened in emergency.

The new electric metal-melting pot, type RP, form F, is equipped with a bottom-pouring spout making it unnecessary to ladle out the molten material. It is designed for melting lead, babbitt, tin, solder, type metal and similar alloys or metals and, according to the maker, possesses the following advantages: heat is generated right in the metal, affording quick heating and low radiation losses; heating units are readily replaceable; maximum rate can be obtained without overheating, and pots are reliable, safe and economical.

Across-the-Line Starter Recently Developed

An improved starter which starts a motor directly across the line has recently been developed by the Lincoln Electric Co., Cleveland, Ohio. Ease of installation, accessibility and rugged construction are some of the advantages claimed. Installation, it is said, is simple, as only four screws are required to hold the starter in place and a drop-hinge cover allows close installation of a group. Cadmium plated steel shields and a wiping action on the points are provided to assure long life, as is a cushion-action relay armature. Replaceable bronze springs are provided and it is actuated by a coiled spring.

Six-Inch Grinder Offered

Unusual value is claimed for the new 6-in. grinder now being made by the United States Electrical Tool Co., Cincinnati, Ohio. Its construction, according to the company, embodies ball bearings, heavy nickel-steel spindle, powerful ¼-hp. 3,450-r.p.m. motor, a fine and coarse 6-in. wheel, adjustable tool rests and complete electrical connections. It is regularly furnished for 110-volt 60-cycle current from a light socket though it may be obtained for 220 volts and two- or three-phase or 110 or 220 volts direct current at an additional cost.

New Ratchet Die Stock

A new complete ratchet threading outfit for the smaller sizes of pipe, named the "Chip Chaser," recently developed by the Oster Manufacturing Co., Cleveland, Ohio, has, according to the maker, several features of interest to everyone who threads pipe. The outfit consists of a ratchet handle and five separate dieheads, capable of threading all sizes of pipe from ⅛ to ¾ in. Other advantages claimed are full chip clearance, ease of oiling, easily operated ratchet device and ability to operate in dark corners and cramped places.